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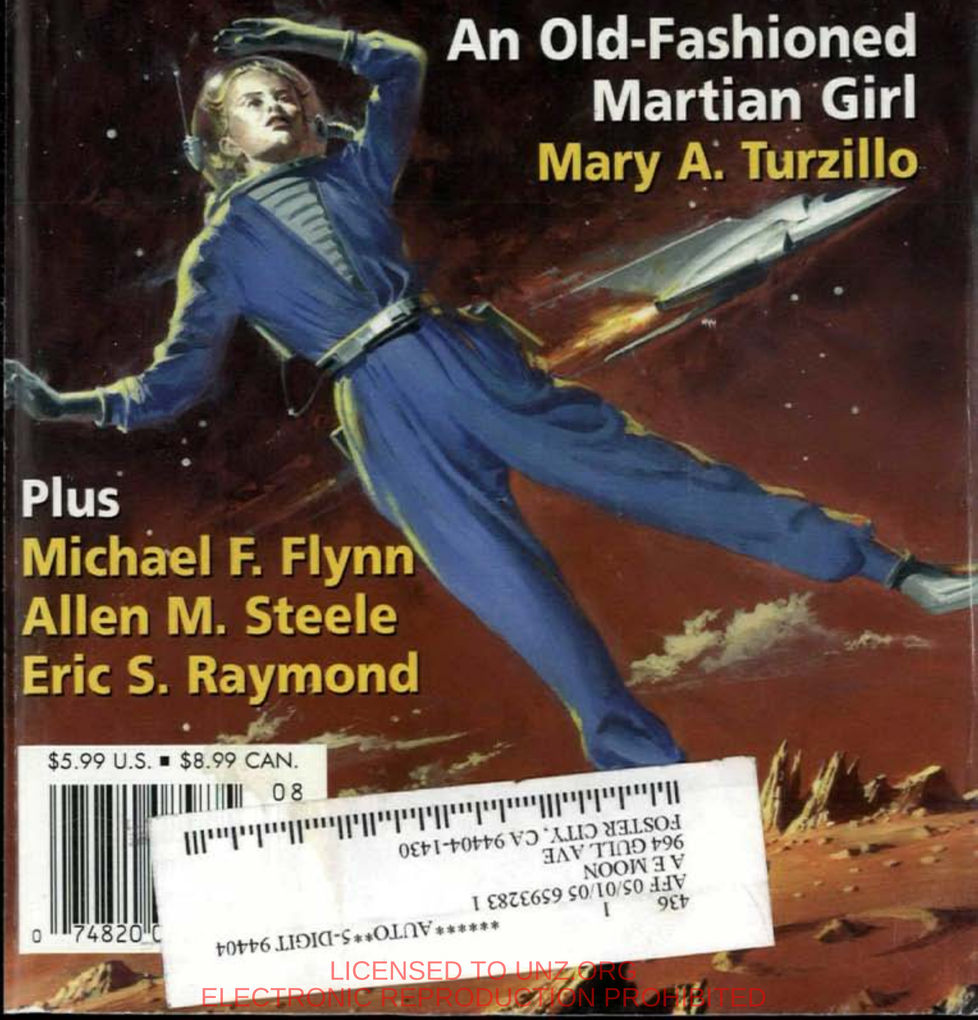

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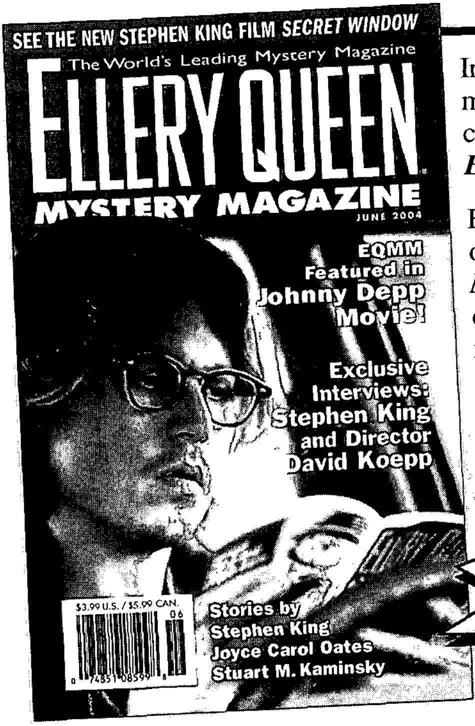

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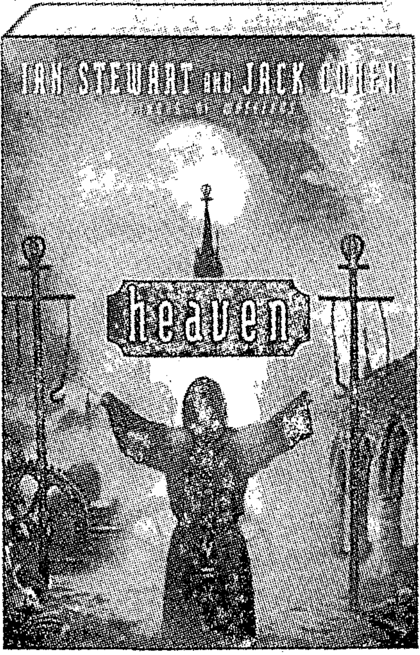

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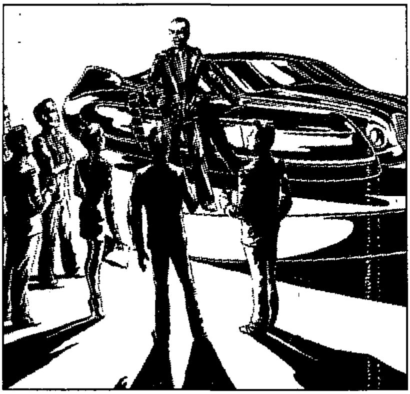

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EDITORIAL Stanley Schmidt

THE PRICE OF FREEDOM

"Eternal vigilance," Thomas Jefferson wrote, "is the price of liberty." There's a lot of truth in that, and the current period of history has made most of us perhaps more aware of that fact than ever before. But there's another price, too, and our current age cries out for reminders of that one.

Probably most of us would rather forget about both parts of the price of freedom whenever we can get away with it, just as we would rather not think about the cost of anything we do. So we needed to be reminded periodically. Recent events have provided plenty of reminders of the need for vigilance, reminders too forceful to be ignored. The need for the other part is just as strong, but so far the reminders have been too gentle, too easy to ignore—so too many of us have ignored them. It's not hard to see why; George Bernard Shaw put it well, if sardonically, when he said, "Liberty means responsibility. That is why most men dread it."

Yet liberty, for people who understand that and are willing and able to shoulder the responsibility that it requires of them, remains perhaps the most important contribution of the great social experiment called the United States. How better to maximize the opportunity for happiness of a people than by allowing the individuals in it, insofar as possible, to pursue happiness in the way that best suits them?

The key phrase, of course, is "insofar as possible." Freedom can't be complete and absolute in a world populated by real people as we know them. If a society tries to allow that by imposing no limits on what individuals can do, some will choose to pursue happiness by killing, robbing, or cheating their neighbors—which certainly puts a crimp in *their* freedom. To maximize actual freedom for everybody to pursue happiness, society as a whole—whether by formal government or some other means—must define limits beyond which freedom cannot be allowed to extend. The principle that best lends itself to consistent application is that people should be allowed to do whatever they want *as long as it doesn't hurt anybody else*. Or, as it is sometimes more picturesquely put, "My freedom to swing my arm ends where your nose begins."

What often confuses people is that this principle does *not* mean that people can do whatever they want to, period. The second part is just as important as the first. To maximize freedom for all to pursue happiness, it is essential that they be able to do whatever they want that doesn't harm others. It is equally essential that they must *not* do things that *do* harm others[1].

There are two basic ways to achieve that. One is for people to voluntarily refrain from actions that harm others. The second is for other people—whether through government, direct action by interested bystanders, or other social mechanisms—to restrain others from harmful actions.

---

[1] Yes, I know it's really more complicated than that. See, for example, "Moral Engineering," Mid-December 1982.

Those two basic methods are sometimes called "being responsible" and "holding others responsible" for their actions. In an ideal society, where everyone has a perfect, unshakable sense of personal responsibility, nothing more would be needed; people *can* be allowed to do whatever they want if no one wants to do anything that shouldn't be done. At another extreme, where no one can be trusted to do the right thing, lots of laws and enforcement would be needed to protect against every conceivable form of nefariousness.

The real world, as usual, lies somewhere between the extremes. Most people would not want, for example, to murder strangers for fun; they are willing and able to accept at least that much personal responsibility. But a few are not; they *do* commit such atrocities, given the opportunity. So the culture of which they are a part needs to have mechanisms for strongly discouraging such actions. In our culture, those mechanisms include laws against such behavior, with strong penalties for violating them. Those laws do not directly touch most people's lives; they prohibit actions that most people would never consider doing anyway. The laws are there to hold the dangerous few responsible for decisions for which they are not willing to assume their own responsibility. They do that by expressly forbidding such actions and promising dire consequences if those deeds are done.

But they have no reasonable hope of exerting such a deterrent effect unless the dire consequences that are promised can actually be expected to occur. That is where our society, far too often, fails miserably. Our governments have volume upon volume of laws spelling out severe penalties that are seldom actually applied—and therefore, quite reasonably, those laws are often not taken very seriously.

A dramatic recent example is provided by the curious case of John Allen Muhammad and Lee Boyd Malvo, the team of snipers who methodically terrorized the Washington, D.C. area during the fall of 2002. I have some familiarity with the case; I was there during part of that period, and paying rather close attention to the news. The testimony and evidence in the trials that have occurred as of this writing (others are still to come) leave extraordinarily little doubt that the duo is thoroughly guilty as charged, and that their depredations were as premeditated as they come. Nonetheless, given the record of American courts in recent decades, I was more than a little surprised when Muhammad's jury not only found him guilty but recommended the death penalty.

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Things seemed to be getting back a little closer to "normal" when Malvo, then eighteen years old, was also found guilty—but the jury recommended not execution, but life without parole. (Wanna bet?) The rationale for this relative leniency was an all too familiar string of excuses. In the words of Matthew Barakat, writing for The Associated Press, ". . . his lawyers argued that he was an impressionable boy who fell under Muhammad's murderous spell," saying he "came to regard Muhammad as a father figure and was susceptible to the older man's influence because of his own father's absences and because his mother beat him and moved him constantly." Barakat quotes one of the lawyers expressly as saying, "Children are not born evil. When they commit evil acts, you can almost always trace the acts to the evil that has been performed against them."

And I say, "That's probably true. So what?"

People's actions do not come out of nowhere; you can *always* find explanations for them in terms of their genetic make-up and the things that have happened to them. But explanations are not equivalent to excuses. Some things are inexcusable, and our courts' perennial tendency to make—and accept—excuses for just about anything is counterproductive in the worst way. To talk about Lee Malvo as a "child" and absolve him of responsibility for his actions is dangerous nonsense. His lawyers' arguments might have some merit if he were a three-year-old whose father left a loaded machine gun where he could play with it. I fail to see how they apply in any way to a street-wise punk in his late teens who can make and carry out the plans this one did.

It takes considerable self-discipline to learn the degree of marksmanship required to carry out these shootings. It takes considerable self-discipline to plot them and to stick to the plan well enough to complete them and get away, time after time. It makes no sense to say that a person who can do those things cannot or should not be held fully responsible for his actions, and expected to accept their full consequences as provided by law. The failure of this court and others like it to do so seriously weakens our society.

Before some of you take pen or keyboard in hand to lecture me on the evils of capital punishment, let me interrupt

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my own tirade briefly to ask you not to bother. I'm at least as opposed to capital punishment as you are—not because I don't think it's ever deserved, but because there's too much room for completely irremediable error. The more I see of real trials, and real cases in which people are proved innocent years after conviction for crimes, the more convinced I become that guilt is seldom established beyond reasonable doubt. If a wrongful conviction is proved halfway through a prison term, there's still *something* that can be given back to the wronged party—that is, the prisoner who shouldn't have been. If the same thing happens years after an execution, there's absolutely nothing to be done; you're left with the fact that the state has mistakenly murdered a citizen. I'm quite uncomfortable with the existence of laws that let that happen, and I've heard of plenty of cases in which it *has* happened. I'd rather see those laws replaced by something better.

However . . .

Given that the laws are on the books, it sends a bad message to everyone else—including potential "copycat" criminals—not to administer the most severe penalty they allow in a case with as little room for doubt as this. But this is not just about Lee Malvo. That's just an example, currently familiar because it happened recently and was widely publicized, of something that happens over and over in our legal system: people guilty of egregious crimes are let at least partly off the hook because their lawyers make weepy excuses for them, and their judges and juries buy them. When people of uncertain moral conviction see this happen more often than not, they quite reasonably get the impression that the laws don't really mean much—that while harsh penalties may be on the books, they seldom happen in practice and you can usually shift at least some of the blame for your misdeeds to somebody or something else.

And that is something that none of us can afford. If we really want to preserve the maximum possible freedom for all citizens, we must do more than keep an eternal watch for encroachments by governments or other organizations foreign or domestic. Most of us must assume full personal responsibility for our own actions, and we must hold others fully responsible for theirs if they are unable or unwilling to do that for themselves. We must fully accept the concept that for some actions there are no excuses. ■

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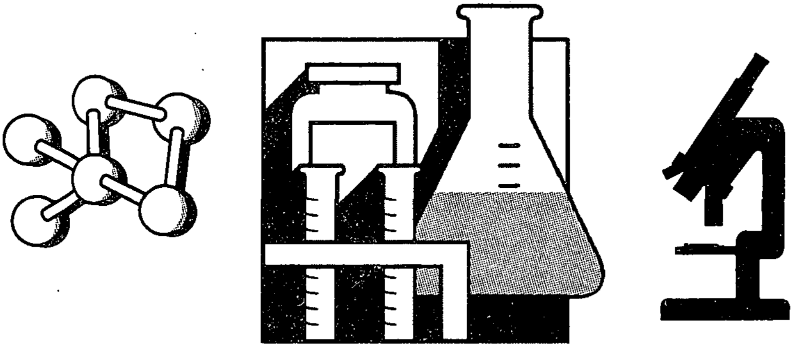


Once again we'd like to thank everyone who voted in our annual poll on the previous year's issues. Your votes help your favorite writers and artists by rewarding them directly and concretely for outstanding work. They help you by giving us a better feel for what you like and don't like—which helps us know what to offer you in the future.

We have five categories: novellas, novelettes, short stories, fact articles, and covers. In each category, we asked you to list your three favorite items, in descending order of preference. Each first place vote counts as three points, second place two, and third place one. The total number of points for each item is divided by the maximum it could have received (if everyone had ranked it #1) and multiplied by 10. The result is the score listed below, on a scale of 0 (nobody voted for it) to 10 (everybody ranked it first). In practice, scores run lower in categories with many entries than in those with only a few. For comparison, the number in parentheses at the head of each category is the score every item would have received had all been equally popular.

NOVELLAS (5.00)

1. "Walk In Silence," Catherine Asaro (5.56)
2. "Lucky Luke," P. J. Plauger (5.37)
3. "The Cookie Monster," Vernor Vinge (4.85)
4. "Seed of Destiny," Daniel Hatch (3.02)

NOVELETTES (0.80)

1. "Tiny Berries," Richard A. Lovett (1.52)
2. "Paying It Forward," Michael A. Burstein (1.44)
3. "The Immortality Plague," Steven Bratman (1.29)
4. "Afterburn," Rajnar Vajra (1.24)
5. "Still Coming Ashore," Michael F. Flynn (1.12)

SHORT STORIES (0.54)

1. "Lavender In Love," Brian Plante (1.26)
2. (tie) "3rd Corinthians," Michael F. Flynn (1.11)
   "A Professor at Harvard," David Brin (1.11)
3. "A Deadly Medley of Smedley," F. Gwynplaine MacIntyre (1.05)
4. "The Spacemice Incident," Carl Frederick (0.99)
5. "The Study of Ants," Carl Frederick (0.93)

FACT ARTICLES (1.82)

1. "If a Tree Falls . . . or, The Secret History of Global Environmental Catastrophe," Catherine Shaffer (3.78)
2. "Isaac Was Right: N Equals One," Ben Bova (3.20)
3. "The Power of Rotting Plants," Robert A. Metzger, Gregory Benford, and Martin I. Hoffert (1.96)
4. "Moving Beyond 'Life As We Know It,'" Richard A. Lovett (1.89)
5. "The Search for Extraterrestrial Oceans," Richard A. Lovett (1.65)

COVERS (1.82)

1. December, by David A. Hardy (2.88)
2. February (for *Shootout at the Nokai Corral*), by Kelly Freas (2.50)
3. July/August (for "The Fire and the Wind"), by Vincent Di Fate (2.15)
4. October, by Dominic Harman (2.08)
5. November, by Michael Carroll (2.05)

Competition was rather close in most categories this year. The strongest first-place lead was that for fact articles, by Catherine Shaffer, a relative newcomer who continues to produce fact articles and will soon also make her fiction debut. Richard A. Lovett, another writer who followed a similar path, placed first with a novelette that apparently struck a nerve for a lot of readers—and placed not only fourth and fifth, but also sixth and eighth among fact articles. A refreshing surprise was the strong showing by "A Deadly Medley of Smedley." Silliness seldom seems to get the respect it deserves when award time rolls around, and they don't come much sillier than this!

The number of votes was pretty good, but since Anlab votes are so useful to everyone concerned, we hope to get even more next time. Use e-mail or "snail mail," whichever you prefer, but please vote! (Please be careful to vote in the right category, as listed in the annual Index. Sometimes a few votes are wasted by being cast in the wrong category, and those simply can't be counted. If you didn't use the online voting on our website [www.analogsf.com] this year, you might want to try it next time; it makes that problem virtually impossible!) ■

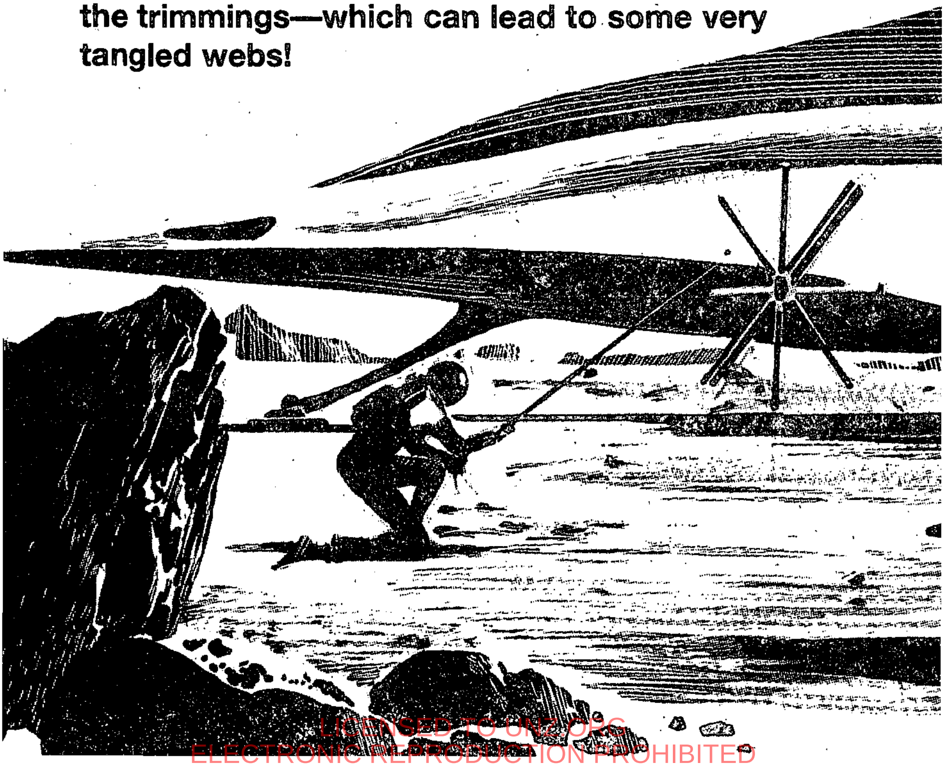
Larry Diersen, of Monroeville, PA, is this year's winner of a free one-year subscription in a random drawing from all ballots received. Next year that could be you—and the more votes we have, the more the results mean!

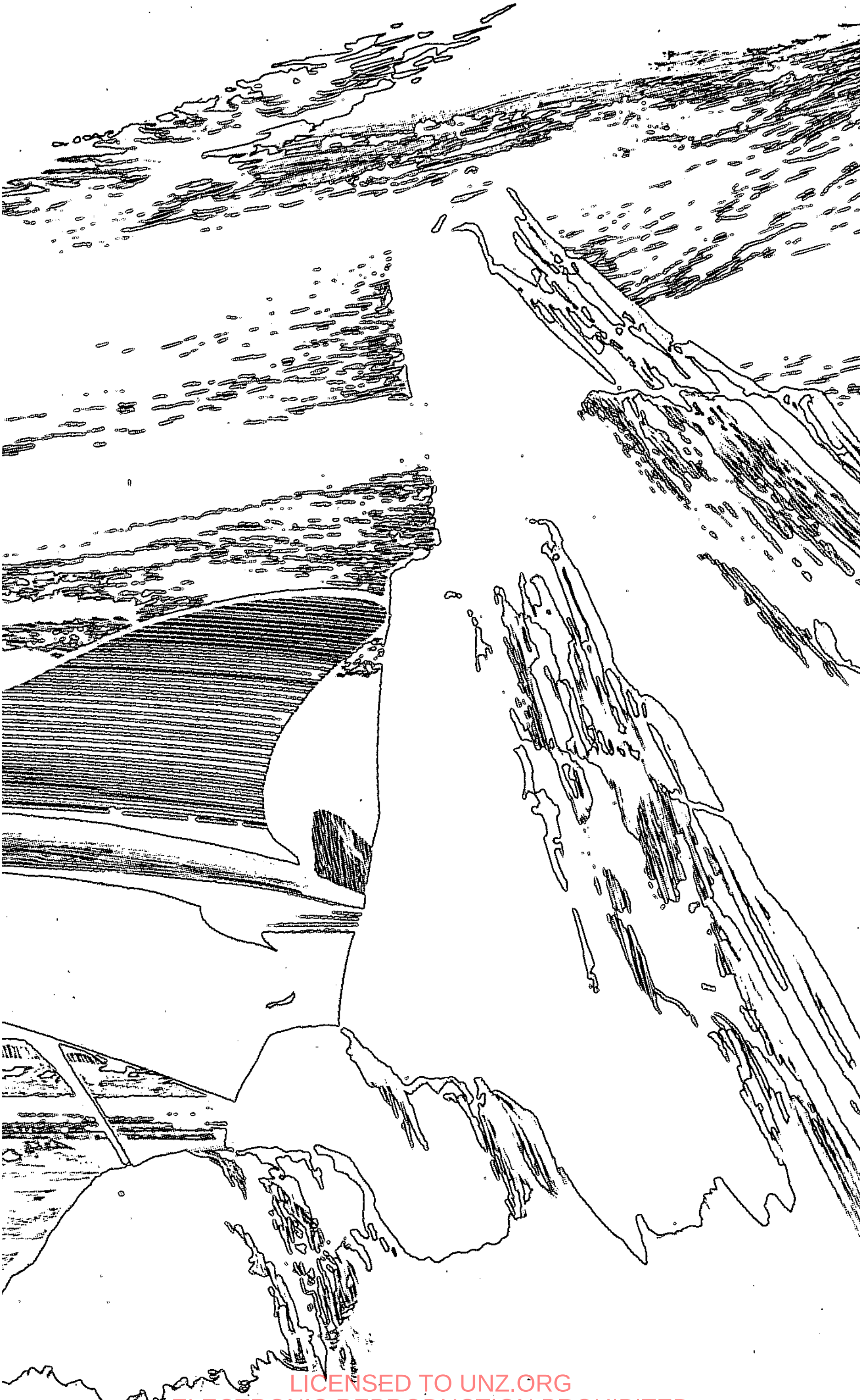
An Old-Fashioned Martian Girl part I

Mary A. Turzillo

Illustration by Vincent Di Fate

A new world will develop its own cultures, with all the trimmings—which can lead to some very tangled webs!





Chapter 1

Free Ride

Nanoannie Centime came awake with a galactic-size headache. Was she on a rover?

No, too smooth a ride. She was on a marsplane. Her many hours in the sky made that tilting, dipping motion familiar.

But the deck underneath vibrated harder than the *Origami Firefly*. To put the chromium plating on her headache, she was seeing everything double. And her hand! It throbbed as if she had stuck it in the plane's engine. For a minute she couldn't remember why. Then her vision cleared and she saw the duct tape. Kapera's rover: there'd been an accident.

She raised her good hand to her head and found she was wearing her helmet, her own helmet. She spoke the suit com on. "Excuse me? Help? Where are you taking me?"

No reply. She made a mental note: once her eyes focused, she was going to be scared spitless.

This was *real* trouble. Last mear when that guy wanted her to be a hostess on a Marsnet nightsite, she could have wriggled out of that easy, even without her parents butting in.

In fact, being a nightsite hostess topped what her parents planned for her, a life of servitude under Utopia Limited Corp. No lover and no friends.

"She woke up," said a voice. Synthetic, like through a translator. A guy or a babe?

"Oh, dust," said another voice, also synthetic, but quicker, sharper.

They didn't want her awake. Scary; maybe she should pretend to be asleep.

In her suit, she felt vibrations as one of them moved back toward her. "She's awake," the first voice confirmed.

The back of Nanoannie's head hurt. Had she fallen? She wanted to reach around and find out if she had a bruise. If they had hit her while she was unconscious, she'd figure out how to get even. Her hand hurt too much to allow her to get up.

The two of them were in Mars camo, which was called *red*, though *orange-tan* was more accurate. Red suits. Scary. People wear camo so they can do you dirty.

One of the suits pushed her back down. "Anoxia. Stay still. I adjusted your suit to compensate."

"Where are you taking me?" Nanoannie thought she was shrieking, but the sound came out a gravely rasp. Her throat felt as if she had swallowed a shovelful of fines, mixed generously with other mineral specimens.

The other voice droned, "I found her parents' little spread on Marsnet. Tell her she's going home."

Nanoannie's vertigo turned to outrage. *Little* spread? Centime Pharm was bigger than Kapera Smythe's pharm, and her parents had a huge installation in Hellas Planitia.

Kapera!

"Where is—"

No. Better not mention Kapera.

"Where is what?" The first synthesized voice sounded preoccupied. "Sit up, please. Raise your arms. Lean forward." The redsuit looped straps over Nanoannie's head. Buckled blue bundles to the back of her suit, to the top of her helmet, and to her backside. "This goes between your legs. Tight."

Who *were* they? The synthetic voices might be translators, because they spoke some weird language—or to hide their identity. They sure weren't from Utopia Limited, her parents' corp. Intercorp Police? Nah. Those cuy-brains only intervened in olympic dustups: wars between pharms, or squatter invasions.

Kapera. If she asked, they would know Kapera was back there at Smythe Pharm. Maybe she *should* ask. Maybe they were good guys; they'd rescue Kapera and take her somewhere.

Somewhere. Kapera no longer had a home.

Screeeebang.

Nanoannie looked down.

Way, way down, at a landscape of ice

and fines, through a yawning hole in the fuselage.

Kapera. Kapera Smythe, that prepubescent runt. Two mears younger than Nanoannie, but in the same on-line math class. Where was Kapera now? Maybe Nanoannie shouldn't have jumped in to help her when she came rolling up to Centime Pharm in the rover she had "borrowed" from her parents, Dr. and Dr. Smythe.

If only Nanoannie lived in a big settlement like Equatorial or Sagan City, she would have a choice of careers and lots of friends. Nanoannie had never visited either city, but a kid from Sagan City in her on-line school said the habs were like Earth apartments.

Kapera Smythe had a ticket to Earth—well, Earth orbitals, but it was a lot nuker than, say, Deimos or Phobos. She'd see all that nuke Earth stuff. She'd get to clubs and meet guys. Except she was too young to appreciate guys.

Kapera's parents, Dr. and Dr. Smythe, had sold their pharm and were packing to catch the Down Escalator, to Earth. Martian schools didn't teach much about the Down Escalator, because Martians hardly ever could afford to take it, especially if they were planning to come back to Mars on the Up Escalator. The Up Escalator she knew more about, because her parents had come to Mars on it. It was an asteroid, actually, with tunnels inside. It had been steered into an orbit so it took people from Earth, down to Mars. Then it circled around in orbit beyond Mars—she had seen the calculations—and rendezvoused with Earth orbit to pick up the next batch of passengers.

The Escalators were named by Earth people, so they had it all upside down. When you come down to Mars, you come on the Up Escalator. When you go back up to Earth, you go on the Down Escalator.

Earth people called it the Down Escalator because the Sun is the center of the solar system's gravity, so toward the Sun is *down.*

Whatever.

Nanoannie had seen the rover coming from a long way away, kicking up a rooster-tail of dust from its rearmost axle. She first thought to run and tell her parents, Krona and Escudo Centime. But they were fussing over her sister Zloty's upcoming first birthsol. Nanoannie was sick of how her parents doted on Zloty. Krona had gotten pregnant again with great difficulty after Nanoannie's birth, or so they said. Nanoannie figured it was because they didn't like having sex anymore, being too old. Krona had miscarried four times. Blamed it on Father Mars. What crap.

So she didn't tell them about the approaching visitor. Instead, she got binoculars to enhance the logo on the side of the rover.

Hm. Smythe Pharms.

She hated to admit how overjoyed she was at the prospect of talking to an in-the-flesh person besides her parents and Zloty.

She would show Kapera her makeup and the gowns she had designed and would create just as soon as Krona bought her a desktop manufacturing unit. Then they would discuss visiting a club in Borealopolis, or maybe even Sagan City.

Kapera would rub it in that she had been to Sagan City. But Kapera was too young to appreciate the city.

True, Nanoannie was also too young, but she could pass for ten mears, the legal age for regulated intoxicants.

She kind of hoped the Smythes had brought Kapera.

The rover stopped and spread out its solar cells to catch the low afternoon sun, but only one figure got out, a small person. No sign of Dr. and Dr. Smythe.

The small figure trudged up to the outer airlock. Nanoannie rushed to open it before Kapera even punched in her code. She fidgeted while the pressure built, then grabbed her own helmet (she had suited up already, she was so excited to have company) and trotted into the low-pressure room.

"I'm in trouble," said Kapera, soon as she got her helmet off.

Nanoannie peered at her. She'd noticed online how Kapera was losing her hair and getting skinny. The stupid experimental diets the Smythes went on. They ought to import a little canned ham from Earth. "What's up? You stole your folks' rover? Does it have enough charge to get us to Borealopolis?"

Kapera went through the membrane to the middle pressure anteroom, undid her gloves, and then wiped her nose on the back of her hands.

Kapera's eyes seemed really big. Then Nanoannie realized why. Kapera must have shaved her head. Or even had gene therapy to eradicate her hair and eyebrows, too. Her eyes looked strange and wet with no lashes or brows.

Kapera said, "Link to my suit com. I have to show you something."

Nanoannie didn't like to wear her contacts (the fines got in everything) and she didn't have her helmet on, so she had to use a wall screen to look at what Kapera showed her.

Kapera' s parents' spread was built on the same plan as Centime Pharm, but the Smythes had, over the mears, built several middle pressure greenhouses on the surface.

The wall screen displayed a greenhouse-style lab, except a lot of plants were torn up and strewn all over. A vine—or was that wiring?—dangled from the ceiling swinging back and forth, as if just cut. Kapera fiddled with the perspective and focused on an airlock gaping open.

Kapera bit her lip. "See?"

Nanoannie bent the perspective around. Kapera took over, impatient, and zoomed in on a leg, visible behind a bench, as if somebody were lying on the floor. The leg was enclosed in an environment suit, but the body of the suit was under a bench.

Kapera said, "Does that look like a Sears environment suit?"

Weird question. "Who knows? Environment suits always come in that loud shade of blue in case you get lost outside. So they can find your body."

"That's not funny!"

Something might be kind of *wrong* at Smythe Pharm. "Those are your parents?"

Kapera leaned into the picture and flipped on her two-way. "Daddy! Mother! Please, wake up! You're scaring me!"

"They might be taking a nap. Maybe they can't hear you."

Kapera gnawed her lip. "Mother called me just after I left. I pretended the link was futzed up. But then *Daddy* called, super upset. And he's always the laid-back one."

"Well, of course." It would have been perfectly nuke if Nanoannie, an almost adult, had run off with the family rover. But Kapera was a mere child. "I mean, it's irresponsible to run off when your family is selling their pharm to go to Earth orbitals."

"Sure, sure, Nanoannie. But why don't they answer now?"

"Why not peek in your parents' puter?"

Even through the suit, she could see Kapera stiffen. "I don't spy on them, and they don't spy on me."

"Come on, hab-rat! That isn't spying. I have a back door to my parents' puter. Surely you must have a way in."

Kapera's voice went slightly hard. "My mother spied on me. That's why I keep my journal on my wrist puter. She got snoopy about it, too. But it's too old to link to the house net."

"So? Turnabout is fair play."

Kapera took a deep breath. "I have privileges in housekeeping and Daddy's science areas. Let's look there." She finger-tipped into the puter, with Nanoannie as a tag-along. Letters, chore lists, recipes, corp business memos, and even family pix.

Nanoannie found a picture of an frisky little boy flirting with the camera, beside an even smaller girl. "Is that your brother Sekou and you?"

"Yep. Me and Sekou. Could you please not look at that?"

Huh? "Why not? I let you see pictures of my sister." This was not strictly true. Nanoannie had never shown Kapera pictures of Zloty. But she would have. If she thought of it.

"Never mind. Leave that picture be."

"How old is Sekou now?"

"Born about two mears before me. Stop asking about him. He's none of your business. Please."

"You have recent pix of him? Is he cute?"

"No! And no!"

Would Sekou be open to a rendezvous in Borealopolis with a tall, blond, blue-eyed girl? Some Kiafricans were prejudiced against white-skinned Martians, but the Smythes seemed open-minded.

Maybe that didn't extend to romance-type things.

Kapera scrolled files. While she was occupied, Nanoannie scanned the picture of Sekou and Kapera and stored a copy on her com's memory.

"No clues," said Kapera.

"Let's go look in person."

Cabin fever. Some Martian-born girls got so used to their home habs that they never wanted to leave. Scared to leave. Happy corp slaves. Not Nanoannie.

She'd use any excuse.

Krona and Escudo were in their bedroom whispering and making stupid giggly noises. Probably plotting against her again. Nanoannie considered stealing their marsplane, the *Origami Firefly*, but they'd get really mad. So she sealed her suit and made to follow Kapera.

Kapera frowned. "Shouldn't you tell your folks you're going?"

"Why? You took your parents' rover without telling them, didn't you?"

"I wanted to bring you my models and cuttings to keep until I come back."

"You're coming back?"

"Darn right. Mars is my home. Earth orbitals are just a place we're stopping awhile. A short while."

"So we're going for a joy ride?"

"No joy, just a ride. Why not tell your folks? They could get Intercorp Police to help us."

"Nah. We won't go inside if anything looks funny. We can call Intercorp ourselves."

Kapera was being a hysterical little kid. Why call the cops? So Smythe Pharm was messy. So the Smythes dropped an environment suit on the floor. There couldn't be anybody inside it.

Anyway, if Nanoannie told her parents, they wouldn't let her go. And she needed some excitement. She and Kapera would just cruise by Smythe Pharm. By that time, Kapera's parents would be awake. They'd invite her in to look at Kapera's games and models, or get on line to the sites her own parents had blocked.

"So. What exactly are you scared of?" Now that they were on their way, Nanoannie was scared too, and she wanted something concrete to be scared of. The rover bumped along toward Smythe Pharm.

Kapera drew a big breath. "I don't know. When I call in, nobody answers."

"The power is down?"

"Not sure. Thought I saw a light shining from the skylight in my room. And I heard some noises through the com connection. Hissing noises."

"Hissing?" Nanoannie suddenly remembered that sand vampires hiss.

Sand vampires, however, were the invention of Nausicaa Azrael, the only person on Mars who actually made a living writing fiction.

Wait. Didn't early explorers have legends of people who disappeared on the polar ice cap leaving only empty environment suits?

They crested a hill and saw Smythe Pharm in the distance.

Lights shone pallidly in the spring afternoon sunshine. Something didn't look right.

Kapera keyed into the house com and listened.

Nanoannie said, "What do you think that hissing is?"

"Don't know. Air escaping?"

Nanoannie suddenly regretted leaving home. "Let's call Intercorp."

"I did call them. Think they'll come, being as my folks are freemen?"

"Sure." But Nanoannie wasn't sure. Intercorp Police did investigate serious crimes. Murder, for example. But not always. Consider the dust-up over that apartment in Sagan City, two brothers both claiming possession. When the younger turned up dead, nothing was done, except for a newsnet editorial.

"I have to go in," said Kapera. "Stay here and I'll call you if anything is wrong."

"Oh for heaven's sake!" Nanoannie didn't want to go inside that empty pharm, but she couldn't let Kapera go in alone. That would be cowardly, and she was a woman of courage. A brave Martian Martialle. "I'll come with you."

At the main airlock, Kapera paused. "I don't hear pumps or ventilators. That hissing stopped."

Nanoannie shivered. "Let's check everything out before we unseal our suits."

Kapera glanced at the pharm entrance. "Even outside something sounds wrong."

"You can't hear anything in Mars ambient." But that wasn't true. Kapera had supersensitive hearing.

Creepy.

"I'm scared, Nanoannie."

Nanoannie had been scared for some time, but she said, "Look, pebble-head, your parents are just asleep. They turned off their suit coms."

Kapera keyed the airlock. As it cycled, she gazed straight ahead.

"Your dad probably yelled at you because he was mad," said Nanoannie. "They're giving you the silent treatment."

Kapera's eyes got huge. "You don't understand, Nanoannie. He was yelling not to come back."

Chapter 2

My Backup

Kapera Smythe, her diary. No date. No location.

Dear Sekou:

Nanoannie Centime is a stand-up friend, even if she's boy-crazy. And I mean hot-blooded. She even asked about you, brother mine.

How we got in this sorry mess: we should have stopped and told her folks, Martial and Martialle Centime, but Nanoannie just jumped in the rover with me.

I have to find our folks, brother. I wish I could just wait and let them find me, but we have only six sols to get the shuttle from Equatorial City to the Down Escalator. And I know they wouldn't run off and leave me. No way.

Well, maybe Mother would. She's so logical and all. But Dad wouldn't run out on me.

Nah. Mother wouldn't either.

I mean, Mother is very cold-blooded, like the way she up and sold the pharm and had us packing before I got a chance to say goodbye to Mars. But she wouldn't leave me behind.

I feel bolder with Nanoannie as my backup. She's older than me, by almost two mears, turning into a pre-ten, which means she gets all worked up over fancy clothes and makeup and sex sites on Marsnet. She's tall, frizzy yellow hair, full of sass, but not really disrespecting folks. And smart. Knows how to fly a marsplane. Her folks taught her when she was four mears old. That translates to eight in your Earth years, brother.

How Nanoannie and I got to be friends: she told me she has a kitten. We were studying together online, and she mentioned this kitten, Fuzzbutt. I said I'd love to see it, and she said some time I could come to her pharm and pet it.

They must be stone rich. Must raise baby mice or cuy just to feed that kitten.

Nanoannie asked to see pictures of our family, specifically your picture. She knows about you because she saw me recording in this diary.

How can I explain about you? You know, how Mother always thought you were just so fine, and smart, and all. She made me feel I couldn't measure up. I guess that's just her way, but it sure does work on my nerves.

And she's so jumpy! Never lets me out of her sight, always nagging: eat my yams and bananas and cuy, and did I check my suit three times. Dad just lets me be me.

But I don't hold it against you, bro.

I just wish she'd—I don't know—act natural, like Dad.

But about Nanoannie. She's like a big sister, so I reckon that makes you and her sibs, in a soulful way. With our folks missing, I'm making up a pretend family. Like some old-fashioned girl.

But dust and rust! I think I've got us two old-fashioned Martian girls in a mess of new-fashioned trouble.

Chapter 3

Inside

Nanoannie asked herself, why *did* I run off with Kapera, anyway? To show Kapera what a scaredy rat she was? Or to show Escudo and Krona I'll never sign indenture with their boring old corp?

Little of both.

The girls cycled through the airlock, Nanoannie close on Kapera's heels.

Dim sunlight filtered through the skylight. The pharm had one of those mirror lighting systems, which reflects light down from the surface, but it seemed screwed up. Kapera used her thumblight beam.

Nanoannie realized right away this was not merely messiness from moving. Racks were tossed over on the floor, shelves broken, potshards everywhere.

Like somebody had picked the hab up and shaken it.

What were they looking for?

A dust cloud drifted. The air handlers were still working.

Someone or something had stomped the plants, cut them up, dragged them to the drysink and poured liquid fertilizer over them. Kapera gave a little sob, then stuck her gloved hands into the drysink mess, pulling out vines.

"What's this red puddle on the floor?" *Please, not blood.* Gag. Blood was worse than nauseating. At least she couldn't smell it through her helmet. If she actually stepped in it she'd have to throw her boot away.

"Bacterial pigment." Kapera threw the plants back in the drysink. "Let's go to the imaging center."

Nanoannie could make out a mess of broken glass and plastic and bent tubing. Kapera wailed, "No! That was our scanning electron microscope."

It sure wasn't a scanning electron microscope anymore. Somebody had taken a sledgehammer to it.

"Can you buy another?" But Nanoannie knew the answer.

"Dad picked it up cheap. Said it was so old it must have come to Mars with Jeffrey Allan. Still worked, though."

It sure wasn't working now.

"What's in there?" Nanoannie asked.

Kapera froze, then darted toward the portal.

Miles and miles of shiny coppery stuff, like Nanoannie's own hair, coiled around the room, all over the place. "What *is* it?" she asked.

Kapera sounded tired. "It *was* a seven tesla magnet."

Seven tesla? Well, *that* hadn't been something Dr. Smythe had picked up at a tunnel auction. Even Nanoannie knew they'd only started making magnets that strong a few mears ago. And it had been *unwrapped*. How could they *do* that?

What *had* they been looking for?

Further into the hab, Nanoannie recognized parts of several atomic force microscopes, so thoroughly totaled that it was impossible to tell whether there had been two, three, or four. Somebody had even melted down the metal base and shattered the ceramic casing.

Inside her suit, Nanoannie smelled the kind of sweat that comes from fear—her own.

"Thing is," said Kapera, "I don't see my mother and dad."

Obviously.

"Wouldn't they leave a message on the computer?" But the house puter eye showed only a popping bubble pattern. The display was working, but the puter itself was down.

"I just thought of something," Kapera pulled a ladder loose from the broken vines and smashed shelving, opened it, and kicked aside the mess so it could stand on all four legs. Gasping for breath, she clambered up to the skylight. In seconds, she was back down. "The skylights are busted."

They ran up the tunnel to the low-pressure greenhouse and cycled through the airlock. The Sun was too low to see much, but glass sparkled over the solar arrays: frames were bent, covers in glittering shards.

The invaders had smashed the solar cells first. The nuke was still working, hence the lights. But the lights were dimming.

Outside the imaging lab, Nanoannie almost stepped in a pile of what looked like fish scales, or iridescent cereal flakes. She stifled a shriek. Storage microdisks.

Kapera explained. "Mother was planning to pack those. She was working on something she didn't want to upload to Marsnet."

"Dangerous?"

"I pay more attention to Daddy's stuff; telomerase budding and modified stem cells." Kapera sounded irritatingly adult talking the tech stuff.

"Weapons? "

"She said for sure it was no weapon."

Kapera kept mumbling. "Rhodopsin-based peptide activity detector": that machine was twisted apart and jammed with planting medium. How did Kapera know all this tech talk? Her parents must put her to work, big time.

More smashed stuff: Kapera groaned. "Time-of-flight mass spectrometers, hybrid quadruple laser cell-sorter/fluorescent cell-sorter—Daddy sort of invented that one."

Looked like the searchers had lost patience here. The apparatus had been thrown so hard the case was embedded in the cement wall.

Nanoannie was really scared now. Her armpits felt damp and squishy inside her suit liner. She whispered, "Kapera, look at the air handler intakes."

Dust was still swirling around them.

Still settling.

She and Kapera looked at each other, then turned and rushed back down the tunnel, through the air lock into the medium pressure greenhouse.

Kapera stopped, transfixed.

"Nanoannie," she said. "Look at your suit display."

Nanoannie's gaze flicked to her display.

A big red RADIATION ALERT.

A thin stream snaked down the greenhouse floor. Nanoannie almost stepped in it, before her suit screamed.

The nuke coolant system was leaking. They watched the radioactive coolant lazily convert another flotilla of microdisks into miniature shipwrecks on a poison sea.

Then Nanoannie saw the invaders.

She put a hand on either side of Kapera's helmet and pointed her head.

Two figures in environment suits stood in shadow, just inside the greenhouse tunnel.

Could those be projectile weapons? *Rifles?*

Nanoannie hissed, "Run!"

"No!" said Kapera. "There's—can you feel it?"

Nanoannie couldn't feel anything, but looking up, she saw motion through one of the mirror-maze skylights.

A big, red rocketplane, much bigger than the *Origami Firefly*, streaking toward the pharm.

Continued on p. 20

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She grabbed Kapera's hand and ran toward the main airlock. They cycled it and stood outside gaping as the rocketplane dropped a grapple.

"Our rover!" Kapera screamed.

The hook snagged the rover. Flipped it on its side.

Kapera ran to the rover. She braced her shoulder against the roll bar to right it. It didn't budge.

The rocketplane did a stall-and-loop and headed back toward them. She darted out to haul Kapera away from the rover and back under cover.

But Kapera was determined. Her arms windmilled, fending off Nanoannie's rescue attempts. Nanoannie gave up and helped her tip the rover back on its wheels.

Kapera crawled in and started the rover, leaving Nanoannie to dither. The rover bumped forward. It wasn't built for speed, that had been obvious on the way over.

From the rocketplane, the grapple dangled like the tail of an angry rat. The hook bounced at the end of the tether. The pilot didn't have a lot of leeway to adjust for Kapera's driving, but the hook struck the top of the rover and skittered over it.

From the sidelines, Nanoannie yelled, "Get out and run!" But Kapera drove the rover forward. Having the advantage of knowing the terrain, she headed toward a pair of boulders. Nanoannie saw her plan: between two taller objects, the rover would be harder to snare.

But Kapera hit a hole. The rover skidded around and whacked the leftmost rock.

The rocket plane started its third pass.

Nanoannie spoke her com into broadcast mode and yelled, "Hey, you! There's a *person* inside that rover."

No. They *knew* Kapera was inside the rover. The whole point was to maroon Kapera and her at Smythe Pharm—then blow the place up.

Nanoannie ran to the rover and peered inside. Kapera's chest was heaving, her eyes closed. Was the rover's nuke containment breached? She had to get Kapera out!

She reached through a gash in the door. Bad idea! Jagged sheet metal snagged her glove.

Kapera's eyes opened. "Go back," she said. "I'll try Intercorp again."

"They're useless!"

"True words. But I'm trapped. What else can we do?"

The rocket plane receded into the distance. No. It circled back, and a suited figure in the cargo hatch was pushing some big dark thing out onto the wing.

Kapera's gaze flicked up. "They're bombing us?"

"They wouldn't! It'll destroy whatever they were looking for."

"Maybe they already found it. Look, the rover com may not have power to reach Intercorp. Go back and try calling from inside."

Three steps away from the rover Nanoannie realized something was very wrong with her left hand. Suit displays told all: her glove was breached.

NO! She would be maimed and never be beautiful!

She raced back into the hab, and ransacked a utility drawer. Duct tape! Would it hold in the cold? She wrapped and wrapped, until her hand looked like a lumpy ball.

She could hear Kapera trying to contact Intercorp. Where was the main house broadcast?

Intercorp was answering Kapera! Thank heaven.

Intercorp said, "No unit in your area, but we'll try to contact travelers passing near who might be willing to help."

Try to contact? *Might* be willing to help?

She scanned the hab entry room wildly. She had to get help! The airlock scissored shut behind her, and she picked an interior tunnel at random.

At the end, she burst into a tiny, well-lit room with a mirror-maze skylight.

The room seemed untouched by the invaders. A crude model of an antique Mars rover—*Sojourner*?—sat atop an ancient holo machine. She turned on the holo, hoping it would camouflage her if they came looking for her.

She glanced at her suit's readings. The room was at hab pressure. Good thing, since she was trapped here.

Terror receded and she glanced around curiously. Her math teacher once told her she had a short attention span.

If she was trapped, why not play detective? The memory in that old-fashioned holo machine might hold clues why two sets of bad guys invaded Smythe Pharm. Or more pictures of Kapera's brother, as a grown-up guy.

Taking a deep breath (in case her sensors were wrong), she snapped her helmet seal and took the helmet off, laying it on the neat cot.

The room smelled like soap and some plant. Not an expensive fragrance like those she had sniffed at that Borealopolis boutique last summer-November. Lavender? In her brief face-to-face time with Kapera, suitless, that's how Kapera had smelled. This was Kapera's room.

The holo projector was easy to link to, but yielded no clues. And no pictures of Kapera's brother Sekou as an adult.

Voices came through the pharm's com system, transforming her snoopiness back to terror. "Martialle Centime! You are not safe! Tell us where you live, and we'll take you home."

Could she risk a call to Kapera, find out if they'd gotten her? Using her suit com would lead them to her.

The intruders knew her name, but if they were from her parents, they wouldn't have to ask where she lived.

Warn Kapera! She flipped on her suit com and broadcast: "Kapera! They're not from our corp. Don't come to them!"

Instantly, she smelled harsh perfume, like phenol or a solvent in her parents' lab.

And she was giddy. Then very very sleepy.

She snapped awake. Gas: they were piping anesthetic gas through the hab's ventilation system. They weren't harmless peacekeepers.

She struggled, but darkness tugged at her. An image flared, a creature from *The Facer Nun Who Couldn't Die*. A sand vampire. Its distorted, silly face laughed deafeningly. She tried to bat it away, and then the harsh sky slammed her down.

Chapter 4

Yam Soup and Fake Yam Seeds

Somewhere—where?! Sometime around Summer-April 10, 2202:

Dear Sekou,

At least they didn't swipe my wrist puter. And I'm in a comfortable room. How long was I out? This old puter is in sorry shape, but it says only a few hours went by since—

Since I got kidnapped from our own family pharm.

When those guys in the rocket plane bashed on our rover, I freaked. Not only was that a super expensive rover, even if it was getting old and cranky, it was the only ride Nanoannie and I had. Nanoannie tried to help, but—

I called Intercorp, then hid in the cargo compartment.

Which was plain stupid. They came and dragged me out. I fought, Sekou, but they injected something into my air. Smelled like a lab solvent. Then I lost track.

I woke up ailing and headachy. Darn them! I hate when I get sick.

And where's my thermos of Hyper-K? I hope it didn't get smashed, Sekou. Mother says it's just a placebo, but it makes me feel better.

That medico said I didn't need it if we were going to Earth orbitals. He said they could fix me up there, good as new. Then we could come back to Mars.

But now *these* people claim they can fix me. Say what?

Right away when I woke up, this woman in boss new red rags came in.

The room must be bugged. Her name is Crystal Spirit. An Earther name?

"Where's Nanoannie?" I asked.

She beamed on me, like, who I was talking about?

"My friend," I said. "She's way tall, eight mears old, blond hair, super blue eyes." Crystal Spirit pulled her scarf back, and I saw she had a lump, size of my thumb, on her forehead. Not a growth: a little bitty face.

"Another little girl?" She smiled. "The rescue crew didn't mention one."

I just itched to know about the teeny face on her forehead, but Nanoannie was more important. "Not little. Taller than my daddy. She has a womanish figure already."

"Nobody like that there."

I bet they did find her, Sekou. What was Crystal Spirit's game? "What is this place? How did I get here?"

"Dear child, an overflight detected a crashed rover near your pharm. We assumed your parents abandoned you."

"They did not abandon me! They were kidnapped!"

The face on her forehead smiled, kindly. "You should replenish your energy."

She handed me a bowl of this grassy mess. It's not any Martian food I ever ate before, but then I didn't see much of Mars until recently. The mess in the bowl tasted like insulation floating in yam soup. I didn't want more than about two spoonfuls.

"Eat, child. Build your strength." She had a big stomach. Must want me to fill out like her.

I didn't tell her about the leukemia, but she guessed I was sick. "Your chakras are out of tune," she said. "This will cleanse your pituitary, and then your first chakra will vibrate with your second."

"These chakras, are they from Earth, or a gene-modified Mars plant?" I asked.

"Darling child!" She slapped a hand on my forehead and stood humming, her hand vibrating, eyes closed. The little face on her forehead stared at me like a laser.

She opened her eyes. "I see you're looking at my Face bindi. Would you like one someday?"

I shook my head and pushed the nasty soup away.

After she left, I peeped around the room. Maybe the insulation soup did help. I struggled out of bed and tried the door.

It was locked. Imagine that.

This humongous mask hung over the bed, plus posters of Mars landscapes with humongous pyramid-shaped buildings.

The big face on the wall favors the little face on Crystal Spirit's forehead, and they both favor the Face on Mars.

Guess where I am.

I've been captured by Facers.

Yup, uh-huh, Summer-April 10, 2202. Later in the sol:

Dear Sekou,

What did I tell you?

Crystal Spirit came back with a white long dress for me. Fine material, if a mite itchy. Might could be Martian-made, maybe from real plants. It was airish in that room, so I was just as glad to put it on. It came with a red belt with little pyramid tassels.

"Are you well enough to go to our evening lecture, dear?"

I reckoned I would learn a power from a lecture, so I nodded yes so hard my eyeballs wobbled.

"Uh, Martialle Spirit?"

She beamed her phony smile at me. I tried not to stare at that Face bindi thing on her forehead. "No honorifics here, sweet child. Just call me Crystal Spirit, and I'll call you—"

"Gray Moon."

She frowned. "That's not what the rescue crew told me."

"I thought I should take a new name." Where did that fib come from, Sekou? I reckon I wanted to get over on these people. Who knows what they already knew about me? "Uh, I had this jar of stuff with me. Did you notice what happened to it?"

"No, dear. You had nothing except your suit and that cute little antique wrist puter."

She was jiving. Even without my hoodoo, I knew they swiped it. But why?

I hopped off the bed and fell flat on my sass.

Crystal Spirit caught my arm. "Poor darling! Shall I send for a wheelchair?"

"No!" I yelled. Then I thought, *better not seem too crazy*. "I'm fine. I just went all dizzy there for a minute."

She pursed her lips sympathetically. "Poor dear! When we get your pyramid treatment established, you'll feel much better."

Pyramid treatment? This was scarier than I thought.

Not only was I talking with a Facer nun. I was at their headquarters, Cydonia Institute for People of the Face.

Cydonia Institute, later that evening,

Dear Sekou,

You can learn a power by just playing dumb.

The lecture was by one Dr. Sphynxeye. I remembered him from some yellow news site, but there he was, in the flesh. A teardrop-shaped guy, skinny on top with a big stomach and butt. His head wobbled forward as he spoke, and his eyes were all kind of squinty, as if he had grit in them. He flashed this big grin at the end of each sentence, as if he'd proved a theorem in geometry class and wanted the teacher to send him a gold star.

Dr. Sphynxeye's lecture was called, "Preparing for the Upcoming Solstice: What Will the Face Reveal in Mid-Summer?" He told us about laser sitings to see if some of the markings on the Face would line up with any particular star. They had decided which one: Eta Cassiopeiae. A double star. Five planets orbit the bigger of the two stars. The smaller was a red dwarf, way far out so it wouldn't bother the planet he liked. He had known for a long time, but kept it secret. Facers seem to like secrets. They decoded a message from the way the Face and two of the pyramids were aimed. One of the planets was about twice the diameter of Mars. Its core wasn't super dense, so it wouldn't have crushing bad gravity.

They had a name for it: Yggdrasil.

It was the home planet.

Yggdrasil is the home planet? Grownups call Earth our home planet, although Mars is *my* home planet.

You must have heard about the interstellar ship. One of the corps, Utopia, I think, is building it for the Facers, but it won't be ready for a whole 'nother fifty or maybe a hundred mears. They need to make this extra-fast spaceship drive for it. Otherwise, the people on it would all be a bunch of dead corpses when they got to Yggdrasil. Even their great-great-great-great-grandchildren would be dead.

It was costing a heap of money, but the Mars Facers and the Earth Facers banded together and kept sending money to keep the project rolling.

They really want to get to that home planet.

After Dr. Sphynxeye shut up, they passed out chlorella cookies. They were nasty, just like always, even when Daddy makes them. It's a sin to waste food, so I snuck one into my pocket in case I decide to bail.

Because I still didn't trust these Facers. I needed to have a little heart-to-heart with Crystal Spirit, my honorary nursemaid.

"Did you ask about my thermos?" I asked when she came to collect me.

"No, child." She grinned. "What was in it, anyway?"

"Just some special tea. I was saving a taste for my brother on Earth." (Oh boy, would she swallow that one?)

"Tea? We have any kind of tea you want here. Surely a thermos couldn't hold enough to be worth taking to Earth."

"It was concentrated." I didn't tell her it had this special fungus in it. Provivarin fungus, that's what the Mormonite Jesuits called it.

"How interesting. We'll have you talk to our lab people about it. Your parents grew it?"

I didn't say a word.

"I'll be sure you get it back if we find it."

The reason kids can't figure out when adults are lying is that it's hard to look up in the adult's face without being obvious. Nanoannie and I talked about that once, on line. She said once she got to be tall, she could look people in the eye and figure them out.

So now, to calculate if a grownup is playing me, I look up at them with my big brown eyes, all sweet and trusting. Looks natural, not sneaky at all. And I check out their expressions.

I bet Crystal Spirit knows where our folks are. She's as phony as a ceramic yam seed.

But I reckon I'll stick around.

Where would I go?

Cydonia Research Institute, Summer-April 11, 2202 :

Dear Sekou: Why won't they give me my Hyper-K back?

Crystal Spirit says I'm too weak to go to any more lectures. She seemed upset because I asked so many questions after the last one.

I can't snoop around much. This wrist puter doesn't have a com—too old and half busted. And my fine Sears suit (used, but reconditioned) has come up missing, and my personal com with it.

If I had my personal com, I could slick around, link to their main com, and call Nanoannie's folks.

Cydonia Research Institute, Summer-April 11, 2202:

Crystal Spirit keeps fetching me these nasty messes to eat. Says the other nuns are calculating how to treat my leukemia. Scary. I've only got five sols before the Down Escalator passes through Mars orbit toward Earth, and we have to catch the shuttle up to meet it.

I don't trust these guys to doctor me, Sekou. They are what our daddy used to call wack. Don't ask me how I know. It has something to do with the taste of Insulation Yam Broth Soup. Or the names they take. I found out Dr. Sphynxeye took his from some book that says aliens ran around leaving graffiti all over in the form of giant buildings and humongous walls you could see from orbit.

Sure. Except the aliens planted all these great clues back when humans weren't climbing any higher than the second story of their mud huts.

The name I chose, Gray Moon, fits right in. Crystal Spirit liked it right away.

Cydonia Institute, Summer-April 12, 2202,

Dear Sekou,

Something *really* scary happened.

Crystal Spirit came super early this morning and shook me in my bed. She has different ideas about manners than normal folks. Is her big stomach a sign she's got mothering hormones going?

I told her "I can dress myself!" but she threw that white robe onto me, then grabbed a wet rag and scrubbed my face.

"We'll use the wheelchair," she said. "You're late. Dr. Sphynxeye has been up all night conferring with the committee. They've made a determination."

Determination? Say what?

Anyway, she shoved me into this wheelchair. I bet I have bruises on the backs of my legs. Then she rolled it down the hall—running! Every time we came to an airlock, she had me get out so she could jam it and the two of us into it. It was *humiliating*.

She finally slowed down. I thought she was out of breath, but no, she was just getting ready to meet the honcho. Doctor Sphynxeye.

I wanted to ask why so many people wore glasses and why there were so many children, but before I could open my mouth, Crystal Spirit pushed me past a lot of secretaries, and bam! we were in a big room with dark blue walls and fake stars on the ceiling.

And standing behind this desk was Doctor Sphynxeye. He scowled, as if I had interrupted him doing something world-shaking like picking his nose.

"The child," he rumbled.

I pushed myself up out of that wheelchair. Crystal Spirit just stood there, too embarrassed to push me back. Seemed scared of Doctor Sphynxeye.

Doctor Sphynxeye's Face bindi was bony, starved-looking. It watched me with a sad look.

He sat down behind the desk, so only the top, skinny part of his body showed, and you couldn't tell he had a big butt. He squinted at me. "You are a special child, precious to the future of humanity."

Sekou, this scared the spit out of me.

See, you might figure if they think I'm important, they'll be nice to me. But he was saying I was important to *humanity*. The Facers have different ideas about what's good for humanity than, say, you or I or Mother or Daddy might have. Their plans for my future might be a mite scary.

Nanoannie says sometimes adults smile to hide little quivers and jerks that show they're running a game on you. So I thought, maybe if I crack a smile, he won't see how scared I am, and won't guess that humanity's future isn't on my calendar this week.

So I tried to smile.

Couldn't do it.

"Don't be afraid, little one." He got up and shuffled around the desk. He plunked his hand on my head. A hot, heavy, damp hand. Then he hunkered down with his fat butt sticking out behind and said right into my face, "What do you know about your parents' discoveries?"

Sekou, that did *not* make me feel good.

See, I do know a little about our folks' "discoveries." And they weren't so important that Crystal Spirit should be shaking all over as if Carl Sagan and Jeffrey Allen popped up in the room and shook hands over a recipe to terraform Mars and Pluto both. As if I were a cork they could pull, and out would gush an underground Martian ocean.

If I was all that important, they wouldn't let me go to Earth to be cured.

They probably wouldn't let me go find Nanoannie and our parents.

They probably wouldn't give me back my Hyper-K.

And when they found out I wasn't all that important after all, they would probably kill me.

"I don't know anything important," I said. "That's the cross-my-heart truth."

"Ah," said Dr. Sphynxeye. "But what about the extremophiles? The deinococcus radiodurans? Didn't your mother learn how it could survive through eons in hard radiation? What about the bacteriorhodopsin?"

I shrugged. "That's just the red stuff that likes salt and we make computer chips out of it." We sold those to some computer companies. Only on Mars, though. The corps don't like you dealing with Earthers or Luners.

"What was in the thermos?" He squinted even harder into my eyes.

"A Mormonite Jesuit gave me that. If you just give it back, I have the recipe—"

Dr. Sphynxeye got up again. I once saw a school vid of an elephant kneeling on its front knees and then getting up. Dr. Sphynxeye reminded me of the elephant. "Child, child," he said, "Trust us. You've been betrayed and deceived so long. But now you're near the Face, the fountain of truth. You can tell *us* the truth."

"That *is* the truth. It's just some bubbly tea that Padre Walter gave me."

"But it has special medical properties, does it not?"

What if they analyzed it and used it all up? "Could you let me contact Padre Walter?"

Dr. Sphynxeye plodded back behind his desk. "What does that screwball cult have to do with your parents' discoveries?"

Crystal Spirit murmured. "She's just a little girl. How could she know anything about the tea or about the extremophile research?"

I was about to say I did too know about extremophiles, and even had my own experiment going with the UV-protective cuticle on frost flowers, but Dr. Sphynxeye cut in, "She knows more than she lets on. She may even be psychic, and her mother has research that could described as diabolic."

Crystal Spirit spoke up again. "Or maybe she's telling the truth."

"No chance. It's too great a coincidence. She's been—hypnotized. That's it. Mormonite Jesuits hypnotized her."

Say what? I'd know if I was hypnotized! I opened my mouth to tell them this, but Doctor Sphynxeye clapped his hands, and bam, two other women dressed like Crystal Spirit came charging in. He said, "Take this poor girl for treatment. Besides having leukemia, she's been brainwashed."

"You can't do that! My parents are freemen!"

Crystal Spirit pushed the big strong women away and knelt by my side. She hugged me and stroked my hair. "Darling, they'll take you to be healed. I'll go with you."

I didn't like Crystal Spirit right then. She maybe thought she was on my side, but she was disrespecting my intelligence.

"I want my father," I said. "You better tell me where my folks are. You can't just disappear us."

Dr. Sphynxeye had been squinnying his eyes up so they looked like my belly button. They popped open. "You pretend you don't know where Doctors Zora and Marcus Smythe are?"

Uh-oh. That stopped me.

They really for true didn't know. Meaning that they hadn't kidnapped them.

Meaning that somebody else had.

Chapter 5

Centime Pharm

Nanoannie gawked through the hole, down, down, down at the fines, sand, and rocks rushing past below.

The woman pulled her to her feet, grabbing her hurt hand. Nanoannie shrieked with sudden pain, then gaped wildly around. A bundle wrapped in rags lay in a dim corner. A body? Was that *blood* on those rags?

Was that Kapera? Or was Kapera still back there, running out of life support while these people threw her out of a marsplane.

"My friend—"

One voice droned, "Pull your arms and legs in, chin tucked to your chest."

"Ready!" roared the other voice, staticky, com battery maybe running low.

"Off you go," said the first, and heaved Nanoannie into emptiness.

Nanoannie tumbled terrified. Those blue bundles! A parachute? No. Parachutes didn't work on Mars. They were an Earth thing. Had to be a parachute! Maybe three or four parachutes, because one wouldn't work.

How, *how* did you get them to open?

The rocks below got bigger. Came at her FAST.

She hit.

WHUMP.

She was dead now. Everything was dark, indigo darkness.

WHUMP! WHUMP! WHUMP whump whump whump whmp whmp wmp.

She was bouncing. Rolling!

Then she stopped bouncing. Scared. Hurt. Her head and throat and stomach and her hand, her hand, *her hand* hurt.

Dark. She was squeezed, like a cuy or a kitten, like Fuzzbutt, into a tiny tiny place. Like a giant put a cushion over her and sat on it.

Dark. Tight, squeezing. Being born into her next life?

Death clogged her breathing.

The squeezing let up and she saw a crack of light.

The squeezing let go, reluctant and slow. Above her the sky glittered with late spring stars. The Sun peeked an eye over the horizon like a holographic mouse taunting Fuzzbutt.

The ground felt soft, then hard, like under an air mattress with a slow leak.

They had dumped her out of the plane in the middle of nowhere. Abandoned her to die as her suit lost power. A horrible death. You suffocate as carbon dioxide builds up. Then the suit cooling breaks down, and you freeze if it's night, or if the Sun is up slowly poach in your own sweat, like one of those eggs in the funny text-only books they wrote about a thousand centuries ago, what was the name of that author? Louisa May Wallflower?

Louisa May Wallflower? What was she thinking! And *eggs!* She didn't even know exactly what eggs were, though the workers on the magnesium plantation kept some kind of hamster that made them.

She was dying! Why was she having such stupid thoughts? Your life was supposed to flash through your mind as you died.

She raised her head and looked around. Dark blue wrinkled things, like skin, surrounded her. She tried to sit up, but she was tangled.

The packages on her back, head, and butt—air bags?—were tying her down. She had fallen hundreds of meters from a speeding rocket plane only to freeze or fry or suffocate because she couldn't move.

The rocket plane was now a twinkle in the northern sky.

Where was the release? She shrieked when she moved her injured hand.

With the good hand, she patted all over her chest and discovered the release.

So the guys in the plane hadn't actually planned to kill her.

Maybe they were Intercorp Police agents. Not the guys that destroyed Kapera's pharm looking for whatever. Should she have told them Kapera was hiding in the rover?

The releases were logical, once she figured them out. They linked to her suit com and said: THIS IS A RELEASE FOR YOUR EMERGENCY LANDING SYSTEM. ARE YOU SURE YOU WISH TO RELEASE?

She had to think hard about how to stand up. Her feet were tangled in a pile of blue skin (must be durafilm—that's what they made air bags of).

Her nose was leaking. She touched her tongue to her upper lip and tasted salt. Just what she needed. A nosebleed.

Maybe she had a broken nose!

How would she ever attract men with an ugly broken nose?

Her nose started to hurt. She hadn't noticed that before. On the other hand, she wasn't dead. She wanted to escape a boring future as a corp hire, but not by dying.

She was lost. Nowhere.

Nowhere? She activated her suit APS and found she was within a kilometer of Centime Pharm. A lucky break—or what?

Can I walk?

Of course not. Nobody can be expected to walk when they have a sky-bit hand and a headache from being gassed and also a broken nose which will destroy forever their chances of being recognized as a beauty queen of Borealopolis or even getting a normal guy to sleep with them.

A kilometer. An entire kilometer.

No! I can't do it! It's not fair! You jerks! You evil redsuits and Krona and Escudo too, they got me into this, forbidding me to go with Kapera, so of course I had to go. Forbidding by inference. She hadn't actually asked. It was also Kapera's fault. But mostly Krona and Escudo.

One kilometer.

In a failing suit.

How much power did the suit have left?

A little bit, said the battery. Maybe twenty minutes.

A kilometer.

She walked, cradling her hurt hand in front of her. If she let it dangle, every bounce made it burn like it was stuck in rocket fire. Even so, each step sent a jolt through her thumb.

Twenty more steps.

Her thumb! What if she lost her thumb? She'd be maimed. She'd never be the toast of Club Equatorial.

Twenty more steps.

And her nose was broken!

No. Didn't hurt any more. Her upper lip itched like mad, though. Dried blood. She crossed her eyes trying to see her reflection in the inner surface of her helmet.

Forty more steps.

She stumbled. As she wheeled her arms to keep her balance (*pain! don't tear your suit!*) she glimpsed a flash of blue a hundred meters away.

Tilted solar cells (old-fashioned blue ones), were slowly chasing the Sun on clockwork bases.

The suit was failing. She broadcast, loud as she could, "Mama!"

Her helmet displays went dark.

They'd gone into sleep mode! Conserving energy for life support. After life support went, they'd broadcast a location signal. A last gasp. Suits were programmed to do that after everything else died.

Sure, it would be too late. It wasn't like you would be in suspended animation. But at least they wouldn't have to search all night.

How long before the suit went down completely? Ten minutes?

"Martials Escudo and Krona Centime," she whimpered into her com.

Another com, somewhere on Mars, was broadcasting, monotonously, "—range of this broadcast. Martialle Nanoannie Centime, daughter of Escudo and Krona, please report if you are in range—"

"Mama!" she yelled.

Her com went dead.

Chapter 6
Worse than the Disease

New Pyramid, Cydonia Research Institute, Summer-April 12, 2202

Dear Sekou:

Tell me, brother: is this what it's like to pass over and be shut up in a tomb?

I'm in this big pyramid. Not a sacred pyramid in The City. A fake, made of Mars bricks.

Crystal Spirit says things in this pyramid "vibrate with the carrier wave, common to all elements, leading to their purity and perfection." So they locked me up here.

In a wheelchair. With my wrists strapped down.

That old squinty-eyed Doctor Sphynx-eye gave the sign, and bam! they shoved me in that wheelchair, strapped my hands to the armrests, and wheeled me away.

I hoped to bail out when it came time to transfer me from the main complex into the pyramid. Hoped they'd give me back my environment suit. But no, there's this tunnel which leads straight here. Just a few airlocks in case of leaks.

Crystal Spirit trotted alongside my wheelchair, lecturing, "Now be a good girl, this is a great honor, don't be surprised if miracles happen."

They centered me on what they called "magnetic lines"—magnetic? on Mars?—and said to keep my eyes on a picture of the Face on the north wall.

And here I am, strapped down in this chair, madder than a lonesome cuy in heat. Bound and determined I will not look at that stupid Face!

At least they didn't cop this wrist puter diary.

Thank Mars and stars I put the puter on subvocal mode. If they heard me calling the Face "stupid" I'll be on ice for real.

Come to think of it, I *am* in ice. I have to go to the bathroom, bad.

What if I disrespected the place by screaming my head off?

AAAAAAGGGGGGHHHHHH!

Cydonia, The City, Summer-April 12, 2202:

Dear Sekou:

What happens is I got a personal nursemaid, but not Crystal Spirit.

This guy about Nanoannie's age with frizzy sand-brown hair sticking straight out in most directions, skin the color of Noachis terrain, comes streaking in.

He screeched to a halt and cocked his head as if I were a real puzzle. "Who are you?"

"I'm Kapera Smythe, and I might ask you the same."

"Kay-See. Spelled C-A-Y-C-E."

"I need a bathroom, for real," I said, nice as I could.

"Nothing like that here." He had one of those Face bindis, one with long eyelashes and a sweet expression "It would foul up the sacred well." I don't think they sent him. I think he was just sneaking around.

"Sacred well?" That sounded so foolish I almost forgot how much I had to go.

"There's an aquifer under this temple. They expect to find it real soon."

Sekou, I bet that I could find that aquifer. Daddy says I have divining ability, only he calls it hoodoo.

Maybe I could trade my hoodoo talent for something. But what? They said they didn't know where our parents are. "Tell me how they know about this aquifer," I asked, crossing my legs.

"How come you can cross your legs?" Cayce asked. "Being you're in that wheelchair and all."

"I'm not crippled, just weak. They say the pyramid will cure me. Something about a carrier wave and etheric energies."

"Oh, sure, that's real true. I had this lizard, and a cleaning robot ran over it, and I brought it here to be cured."

"So was it cured?"

"Well, no. They took it out and it died. But I got in trouble because this place is sacred, and the lizard wasn't good enough for it. You must be high class, or you wouldn't be here."

"I guess." I reckon I should feel honored, Sekou. I still wanted him to turn me loose, but I was nosy: "This lizard, was it a pet?"

"I planned to breed it. I had a lucrative business. Or would have, if they hadn't killed one of my three females. Of course I'd have to tithe 90 percent to the Generation Starship Effort." He glanced around as if he wasn't supposed to be talking to me, but his Face bindi winked.

"So why are you here now?"

"I left a clutch of eggs here, not that it's any of your business. Hoping more of them would hatch." He tugged on one of those sandy kinks in his hair. "My turn. Where are you from?"

I paid no never mind to his question. "You believe this cuy crap about magnetic lines?"

"Everybody else believes it." He winked. "So it must be true, right?"

"Okay. You seem straight up, so I'll answer your question. I'm from Smythe Pharm and Laboratories, Arctic Circle."

His Face bindi blew me a kiss. "How come you get the special treatment?"

Special treatment? I shivered. "Don't ask *me*. I had some fermented tea with me, and your Sphynxeye guy got all nosy about it. And about my folks." Should I trust this guy? He talked like a kid, but his eyes seemed old.

He whistled. "They haven't discussed this in the evening lectures. Must be top secret."

"While you're thinking about top secrets, could you please turn me loose and show me the facilities? I'm about ready to float away."

He started working on the buckles. Once he got them loose, I staggered out of the chair. "Okay! Now, where's the bathroom?"

"Like I said, there isn't one."

I drew in a breath to scream again.

He put a hand over my mouth. I almost wet my pants, but he let me go and said, "Don't do that!"

"Why? Will they execute me for screaming in their sacred pyramid?" (If they got hinkty I'd say I was possessed by an ancient spirit. I'm good at storying, Sekou, as you must know.)

"Because I'm not supposed to be here, idiot."

"So I should care?"

"No. But you seem like a nice little brat, not whiny like my little bitch sisters."

"You'll get in a lot of trouble?"

"Shitfire, kid, I'm undergrounded for my smart mouth. And for the caper with the lizard. Solitary until Summer-May."

"How'd you get out?"

He grinned. "My secret."

"Hm. You must know your way around. If I promise not to scream, will you show me a bathroom? And a com. I need to contact somebody."

"And if I don't, you'll scream?"

I grinned my most bratty grin.

He cocked his head. "Will you tell them who let you loose?"

"Course not." Then I had to ask. "Why did they leave me alone, anyway?"

"Can't say for sure, but the pyramid is extremely powerful. Power lines run all through it. They say a normal person could fry from such high vibrational energy."

That sent a twinge to my bladder. "And I'm not normal?"

"Guess not. Listen, I can't stand around and baby-sit you. We better evaporate."

"What about your lizard eggs?"

"Gone. Rats must have got them."

He strode on his long legs toward the wall. I didn't see a door, but he looked over his shoulder and said, "You coming?" and the wall opened.

One of those trick walls you see in videos of habs owned by rich people.

Then, bam! the opening slapped shut again. Cayce almost smashed into the wall.

He drew up short, then eyeballed me as if I'd slammed that door myself.

I shrugged.

Then, WHUMP! The ground shook.

Are there such things as Mars quakes? I can't take a stand, but I do know the ground shook.

Brick fragments showered from the top of the pyramid.

"What's going on?" I asked Cayce.

"Shit if I know." He went down on his knees to look at the crack where the door was supposed to open.

A com sputtered on. No visible speakers. Must be one of those new jobs that float around and vibrate the air with teeny fans like insect wings.

"Kapera, keep calm." The voice sounded like Dr. Sphynxeye. "We have ill-mannered visitors, but you are safe inside the pyramid."

"You trapped us!" screamed Cayce. "Cuy crap! Fish rot! Stop imitating the honcho, and let us out!"

Say what?

A boom just about busted my ears. A brick slammed into the ground. It almost hit me! Another brick. Two more! A singing, vibrating buzz. Sekou, I'm afraid! If the room depressurizes, what

Chapter 7

Missionaries

"Nanoannie! Why did you run away?"

"What happened to your nose?"

"What happened to your glove?"

Krona and Escudo pulled her out of the airlock, mashed her in hugs, turned her around to look at the dust on her suit, and poked the tape on her glove.

Dramatically, she rolled her eyes up and let her body slump. They hustled her down into the living room, full of homey smells of cooking and warm bodies.

They peered at her as if she had answers.

She didn't.

Escudo flicked on the exterior cams and frowned at the panorama outside. "Just where were you?"

"I went with Kapera, guys." Nanoannie made her voice small.

Her parents swelled up like environment suits way over-inflated. Prepped to say something she didn't want to hear.

She blurted, "Somebody trashed her parents' pharm looking for something, for Mars' sake!"

"Father Mars and Baby Stars!" Krona

flung herself onto a chair, hands over her face. "I knew those people were doing weapons research!"

Escudo scowled. "You could have been killed! The Smythes are weird. Freemen. You can't predict what freemen will do."

Krona moaned. "It must have been Land Ethic Nomads. They'll stop at nothing to find secret research to sell to the Earthers."

Escudo's jaw muscles tensed. "Or maybe one of the Slaver Corps."

"Daddy, *please*, there aren't any Slaver Corps on Mars." Except, all corps were all slaver corps, in her opinion.

"If Intercorp gets wind of this, they'll interrogate you. We'll be fined! Oh, Mars! What if this means you can never get a contract or a husband? And neither will Zloty!"

Nanoannie ignored the pain in her hand. They were overreacting. Did they care about her, or just the damned money? "And just *why* would Intercorp be mad that I went over to Smythe Pharm?"

"They'll think you were doing corporation espionage!"

"Daddy—" How could she explain that she hated their corp and would rather die than knuckle under?

Just then, a crash sounded from somewhere deeper in the hab, followed by an ear-piercing shriek. Zloty.

A diversion. Nanoannie could have kissed her baby sister. Krona jumped up and scurried off. Shrieks continued, which meant Zloty was still alive.

Escudo, however, still stared at Nanoannie, not looking at all like the nice Daddy she expected to find waiting, so relieved she had rescued herself.

"Duh! Kapera would never spy on anybody." Nanoannie began to strip off her environment suit, filthy with dust and fines. The deduster would never get it clean. It was hard to undress with her sky-bitten hand, and she whimpered louder than necessary, hoping Krona would come and help her. But Krona was busy with Zloty, and Escudo disappeared into the lower levels of the hab. The suit was so new it still smelled like fresh plastic—she had outgrown the old one—and its fasteners released with voice commands. Still, it took forever to get down to her suit liner.

She shrieked when the damaged, taped glove parted from her sky-bitten hand.

She wanted to leave the suit and helmet on the floor in a heap, but she knew what Escudo would say. So, cradling her burned hand protectively, she nudged the suit over to the deduster with her foot, then bent and threw it in. The sanitary pack was a modern one which extracted most of the moisture, so she had only to put the smelly thing to soak in the waste treatment receptacle.

The glove, lumpy with tape, lay on the floor looking like a sand vampire cocoon.

Then she sat down in her dirty, sweaty suit liner and cried. Her nose started bleeding afresh, and her hand throbbed like fire.

Krona came back, Zloty on one hip.

"We checked with Intercorp. They say Smythe Pharm shows no activity, but there was a rescue call, and a civilian plane came and picked up a Kiafrican girl. That has to be your friend. Are you satisfied? She's okay."

"Civilians? They sent *civilians*?"

"Intercorp expects any nearby vehicle to do rescues, you know that. Nanoannie, what happened to your hand?"

"Duh! I tore my glove! It was horrible, okay?" Did she want sympathy or just to be left alone? She stretched out her hand.

Krona blanched. "We'd better send an image for a diagnosis."

Diagnosis! Nanoannie's skin prickled. She squinched her eyes shut, opened them, and looked, really looked, at her hand.

Dark, bloody red. She caught her breath and hiccupped in hysteria. Ruined! She was ruined! It was her *right* hand, and she needed it, to fly, to put on make-up to go to Club Borealopolis, and to wear the fabulous Mars hematite rings that men would give her—no—that Kapera's brother *Sekou* would give her when he met her.

"It's all right." Krona tucked a blanket around Nanoannie's shoulders, then got her a cup of banana nectar and a washcloth to wipe the blood off her face. "It'll be okay." She sounded worried.

Nanoannie sneaked another look. The hand seemed swollen. She tried to wriggle her fingers. She closed her eyes and leaned against her mother's shoulder. When she opened them again, her father gave her a pill.

"Let's send an image to the doctor in Borealopolis." Escudo fed her the banana nectar.

Better. Excellent, in fact. The doctor they usually consulted was a young, Kiafrican man, newly come to Mars from Earth, and over the cam, he looked super nuke.

Kiafrican, like Kapera's brother. What would Sekou look like now? She did some mental calculations: Sekou would now be about eight mears old—if he was on Earth now, that would translate to—what did they call Earth mears? *Years*. He would be fourteen or sixteen in Earth years. And she would be sixteen years old if she lived on Earth.

If she wasn't mutilated. A broken nose and a frost-vacuumed hand. Martian guys wouldn't look twice at a woman with deformities.

Only maybe Sekou was a high-minded person, like Kapera. Kapera would still like her if she had an ugly scar or was missing a hand or part of her nose.

They sent the call and waited. Nanoannie hoped the young Kiafrican doctor would be in. His last name was Pinkerton, his first name one of those weird Earth names like Ezekiel or Bob.

The pill made her mind wander.

Mother said. "There are heavy local storms. Global Surveyor reports poor visibility between us and Borealopolis."

Escudo sounded worried. "So we can't use the plane. They can send a telesurgical robot over by rover. That won't take long. A sol, maybe. Maybe Utopia Limited will pay for it."

"They won't. It's 'self-inflicted injury resulting from voluntary recreational hazard.' Remember when Zloty swallowed Nanoannie's Earth penny?"

"We can try." Somebody was chirping the hab entrance. "Maybe it isn't as serious as it looks."

"Somebody's at the airlock. Could that be the surgical robot so soon?"

"Maybe they already knew how serious this was."

"Escudo, stop trying to frighten me."

Their voices descended to whispers. Nanoannie strained to hear them. Then Krona said, "Let them in. They're not going to give us Cape Armstrong flu, you know."

She bustled back into the living room. "We've got a connection to Dr. Pinkerton."

"Mother? Krona? Could you please lighten up and tell me who's at the hab entrance?"

"Just some crazy Mormon Jesuit missionaries. There's a storm coming down and they can't see their feet in front of their knees." She adjusted the cam to view Nanoannie's sky-bitten hand.

Dr. Pinkerton's image appeared on the wall screen. "Now, Martialle Nummy, tell me what happened."

Another charming mispronunciation of her name, how delightful. "My friend was in an accident. I was trying to rescue her, and I tore the glove." She burst into tears. "It's horrible, isn't it?"

Dr. Pinkerton was silent, and Nanoannie glanced over to see if her mother had broken the connection.

He said, "My god."

Nanoannie's insides flip-flopped. "Am I going to lose my thumb?"

Pinkerton completely lost it. "No, no, no, no, of course, of course. We can save your hand, and probably your arm, too. Maybe even the shoulder. But we have to act fast."

Huh? He had things all backwards. He

didn't sound too competent!

Krona broke in. "Can you send the rover with the telesurgeon?"

Pinkerton said, "I—I'm not sure—the sky-bite specialist might want to teleoperate the telesurgeon. And he's in Sagan City."

Krona said, "Can't he operate from Sagan City?"

Pinkerton said, "Yes. Yes, of course. I should have thought of that."

Nanoannie took another look at Dr. Pinkerton. He wasn't very old.

Pinkerton said, "I'll order the robotic surgeon right now."

He signed off, and Nanoannie said, "Mom, in case you didn't notice, he didn't seem real *competent.*"

"Nonsense. Why wouldn't he be?"

"Yeah, well, didn't he just come down from Earth?"

Krona opened her mouth and closed it again. "He was educated on Earth. He's got to be competent."

Escudo's voice came over the com. "Krona, we need to figure out what to do for these girls. They came in a hopper and visibility is headed toward zero."

Girls? Huh?

Krona flipped the com-cam to the entry. On the projection, Nanoannie saw two women of about ten mears standing there in their suit liners. One had a blanket around her shoulders. Escudo was digging through a closet, throwing blankets, suit parts, suit liners, and spare helmets on the floor.

"Send them down," said Krona. A moment later, the two girls stumbled in, trailing mixed fragrances of mint and bubblegum. They looked cold and hopeful.

Nanoannie slid her sky-bitten hand under her own blanket.

Krona said, "What in the world caused your Madre to send you out in this weather?"

The blonde girl smiled apologetically. "We insisted. We had a feeling that somebody up here in the frigid north needed the word of God."

Nanoannie's mind was free-floating from the pill her father had given her. Frigid north? Like, it was warm in the south? Then it occurred to her that the missionary, born on Mars, regarded anything above minus thirty C as "pleasant weather."

Nanoannie said politely, "Your hairdo is nuke."

The blonde girl put her hand to her spiky blond locks, the color of a polar sunrise. She was the one that smelled like bubblegum. Nanoannie liked her own wild curls, candle-flame blond, but this girl's style was, well, interesting.

"I like yours, too," the girl said politely.

The dark-haired girl, who smelled like mint tea, said, "We got our hair done before we left on our mission. To make a good impression." Her own hair was braided with red beads in a pattern that Nanoannie, in her drugged state, couldn't figure out, but looked like something Kapera might wear, if Kapera still had hair. Except this girl's hair, since it was straight, was poking out of the braids. Pulling her helmet off probably hadn't helped. "My name's Immaculata, Elder Immaculata."

Krona asked, "Is that your born name, or did you take a name when you converted?"

"Oh, ma'am, I didn't convert. I was born to two L.D.S. Jesuits. They weren't Madre and Padre, unfortunately. I was the product of a premature marriage."

"Premature *what*?" said Nanoannie.

"Premature marriage. They're supposed to wait until they are fully confirmed. But they ran off and had a civil ceremony. They named me Immaculata, which means Spotless, so people wouldn't think I was illegitimate."

A weird confession when first introducing oneself to unconverted pagans out here in the polar wilderness. But it also sounded like Immaculata came from a line of people who had trouble keeping their pants zipped, which was nuke.

"My name is Nanoannie. Like, a unit of electronic currency. Used on Luna and in

Hellas Basin. We have this plantation in Hellas." The pill was making her babble. "People think it's something to do with nanotech, or just means *little*. But I'm not. As you see."

"Oh," said Immaculata. "I thought maybe it was after the nanobacteria."

Weren't Kapera's parents researching nanobacteria? Was that what the invaders at Smythe Pharm had been looking for? "Huh-uh, *nothing* to do with nanobacteria."

The girl with the scimitar-shaped curls skipped over to Nanoannie. "And my name is Abish, just a plain ordinary L.D.S. Jesuit name, with the emphasis on L.D.S." She extended her hand.

"Pleased to meet you," said Nanoannie, and stuck out her own hand.

Her right hand. The sky-bitten hand that looked skinned and bloody.

They looked at it curiously. Nanoannie yanked it back.

"What happened to your hand?" the girls asked simultaneously.

Oh shit, thought Nanoannie. She looked at her hand and wished it would just fall off.

"Nothing. Nothing at all. I just cut my glove and got sky-bite."

"Oh, that's too bad," said Abish. "Has the doctor seen it?"

"Over the cam. He thinks he can save it." She stood up, sat down, and burst into tears.

Immaculata asked, "What's wrong?"

"Would *you* want to be a cripple?" Nanoannie sobbed.

"Oh, my." Abish leaned over and pulled the blanket gently off the injured hand.

Escudo strode into the room. "You girls picked a fine time to go proselytizing. Your hopper might be able to take off in this red-out, but you'd never be able to see to land."

"It has a radar landing system," said Immaculata meekly.

"Girls, I know guidance, and no way will I let you take off in that hopper. Send a message to your Madre that you'll be here until it's clear."

Abish brightened. "I hope you won't mind if we share some thoughts about Jesus our Personal Savior and Lord over the Galaxy."

That stopped Escudo.

Nanoannie wiped away her tears. Any Martian hab, by custom, had to host visitors—no matter how long they stayed—in case of weather or mechanical breakdowns. Just her luck that these two were girls, instead of Mormon Jesuit guys, who were said to be naive, gullible, and also sex-starved.

But they weren't guys. They were girls. Mormon Jesuit girls, sweet and innocent and inclined to harp on one subject, some transplanted Earth religion which was even weirder than Facerism.

"So, I laid out your sleeping bags in Nanoannie's room, and she'll show you the bath."

Nanoannie remembered that she had been crying. "Aren't you going to ask me if I can, *Escudo*?" She wanted to call him *Daddy*, which irritated him because she used it to wheedle him, but in front of these two simpering religion junkies, she seized upon the family custom of Adult Names. "I'm weak from having my hand sky-bit and then I was gassed, and I have a nosebleed, too. In case you forgot."

This was for the benefit of the two missionaries. Escudo had already heard it. She was saving her description of worst part of her ordeal, those synthetic translator voices on the marsplane discussing how they were going to dump her in the dunes to die.

Escudo looked confused. He hadn't seen the doctor's reaction to her sky-bite. "You forgot the part where you ran away from home and nearly got yourself killed." He blew out a tired breath, "Well, take them to your room. And you can wait there for the robotic surgeon."

Abish cleared her throat. "Don't fuss. We packed a lunch and ate it on the hopper."

What with that funny anesthetic gas, Nanoannie had forgotten she had nothing in her stomach except a big glass of banana nectar. She suddenly noticed the odor of Wabash-Wahoo Brand Ham-Essence, which was almost as good as meat. "I'm not too weak to eat, in case you care."

The girls smiled hopefully. Maybe that box lunch they had eaten on their hopper had been skimpy, and a long time ago, too.

Escudo keyed on the house-com. "Kronaaaa! They're hungry!" Why did he have to yell like that?

Her mother's tired voice came back. "I'm making sandwiches." After a moment she came into the room, carrying a carafe of hot mint tea.

Abish said, "We eat anything. Don't worry about dietary rules. Except coffee and nicotine. Not that we ever see those in respectable habs." She reached out to pat Nanoannie's hand, and Nanoannie shrieked.

The pain wasn't all that bad. Probably her nerves were damaged.

"Sorry. I forgot about your sky-bite," Immaculata said. "But I see somebody has taken care of it."

"What?"

"Mercurochrome," said Abish.

"I never heard of Mercurochrome for sky bite," said Krona. "It isn't in the standard first aid texts. I'm not even sure what Mercurochrome is."

"Oh," said Immaculata. "That's an L.D.S. Jesuit thing. It's the most important thing in our first aid kits. We use Mercurochrome on everything."

Abish said, "Looks like somebody painted your hand with it. That's why it's all red. You—didn't know?"

Escudo came in, arms full. "Girls, here's your suits. You can dedust them after you've had supper." He dumped them on the bench.

A com fell out of one of them. A com with a translator.

The hair on the back of Nanoannie's neck stood on end. Without a word to Abish and Immaculata, she ran after her father.

"They have translators," she whispered. "Just like the people who kidnapped me."

Escudo turned wearily toward her. "Nanoannie, lots of people use translators. Suppose they landed here and discovered we speak Cantonese?"

"You never listen to me!"

He sighed. "Okay, we'll put them up in Zloty's room, and Zloty can move in with you—"

Always twisting things. *Never* listening.

Nanoannie pivoted away and stalked back toward the two girls.

Why did they need translators? They both spoke perfectly good English. It was the commonest language on Mars, except maybe Mandarin.

Should she boobytrap their baths? Cross the coolant line for the nuke with the one that went to the bathroom?

The two girls were smiling. Confront them directly! "By the way, you wouldn't happen to know offhand who kidnapped the Smythes?"

Immaculata blinked. "Smythes? The owners of that abandoned pharm east of here?"

"We were hoping they'd be home because their page mentioned they raised cuy," added Abish. "I haven't had cuy in months."

"Cuy? You can talk about food?" Nanoannie controlled her voice. "Two people are dead, and you pretend you don't know who did it! You pretend not to even care!"

"Dead?" said Immaculata. "Somebody died? Where?"

Escudo came back. "Nanoannie, your mother wants to talk to you."

Immaculata and Abish turned to examine a drawing Nanoannie had done when she was a baby. Or was that Zloty's?

Krona dragged Nanoannie into the utility room. "Nanoannie, what in the world is wrong with you?"

"Mother, do you have brain damage? These people are dangerous! They're the ones that dumped me out of the plane.

And painted my hand red."

Krona closed her eyes for a count of ten. "You and your little friend Kapera have some real imaginations, you know? Dashing off on these wild sorties, getting hurt or lost. We had to extricate you from that gang that tried to use your picture on a sex site."

"It was just a dating site, *Mother*."

"Nonetheless. Kapera Smythe is a bad influence and I forbid you to see her again. Not only that, you'll communicate with her only on open channel!"

"You never let me have any friends! Anyway, Kapera is missing!"

"So Kapera ran off on a wild dust-devil chase! I bet you actually know where she is."

Nanoannie put on her irritating adult voice, the one she had learned from her mother. "You don't even care about my hand, do you?"

Krona fed scraps into the composter. "I do care. Very much. But I overheard what those two missionary girls said. It's that funny color because the people who gave you a lift painted it with a disinfectant. And you have the nerve to accuse them of, of—" she frowned. "What are you accusing them of, anyway?"

Nanoannie tried to formulate a theory. What exactly *had* they done?

"Nanoannie, give them a chance. You're always complaining about not having friends."

"Okay. You win, as usual. But—those translators—"She looked at her hand. It was red and tingly. She flexed her fingers, and they all worked, although the skin felt burned.

With a damp dish towel, she dabbed her hand.

The Mercurochrome, if that's what it was, did leave an orange stain on the towel.

Something was weird. But she couldn't put her misgivings into words.

Back in the living room, Immaculata and Abish were doing suit checks.

"Don't bother packing us a lunch," Abish said. "We're leaving. It's all right. We have to be thick-skinned, that's what Madre Yvonnette said."

"You're going out in the storm?" asked Nanoannie.

Immaculata's lip trembled. "We've taken off and landed in storms before. You can image the ground fairly well with radar. We'll just hope we don't land in a crack in the ground or on a big rock."

"Don't go," Nanoannie said. "I was being silly. I apologize."

"We don't know anything about these dead people or your friend Kapera," said Immaculata. "We just came here to spread the Lord's word."

Nanoannie had a blinding revelation. She had been a creep. Those people on the plane had probably been trying to help her. They did drop her near her home. And maybe the weird red stain *was* good for skybite.

"Please," she said. "Sharing my room with you would be nuke. I don't have any friends except on line. Except for Kapera, and I only met her twice in the flesh."

Abish stood up and wandered toward the kitchen, from which yummy smells wafted. "I always wondered what it would be like to live isolated like this. That's why I asked to do my mission in the polar community."

Community, meaning pharms separated by hundreds of kilometers, connected only electronically? "You live in an apartment, like Earthers?"

Immaculata's face lit up. "Yes! All crowded together, lots of people, all ages, each doing their own province, just like the L.D.S. Jesuits on Earth."

Abish added, "Only there aren't any L.D.S. Jesuits on Earth. That started on Mars. Because Maynard Beaufeather and Padre Helouis Barnoble and their flocks had to share a three by three hab in Sinai Plane. An angel, a special Mars angel, told them to find some righteous Martian women, and—"

Nanoannie sensed an entree into their spiel, so she interrupted, "I want you to tell me about that. Later. My Mom says the dust storm will last a while." She looked at them sidelong. "In these habs, all smooshed together, are there also guys?"

"Of course. Older guys, too. But I prefer younger men. They're more Post Colonial. The old, first gen ones are too desperate. More men immigrate, you know."

Nanoannie decided Mormonite Jesuitism was an excellent religion for girls, who apparently were allowed to fly around unsupervised, and be romanced by lots of extra men. "You have boyfriends?"

Abish said, "I'm engaged to a really nuklear guy. And Immaculata—"

Immaculata swatted her playfully. "Quit that!"

Nanoannie looked from one to the other, puzzled.

Immaculata blushed, "My parents won't let me go steady. I really like one guy, but I go out with another so it won't look like I'm engaged."

Which planet did they think they were living on?

Immaculata asked, "How about you?"

Nanoannie's mouth shut and opened again. *Say something!* "Oh, I have a boyfriend, but I don't want to get all serious yet. I want to travel, see the sites, maybe solve some—" She almost said *solve some murders*, but finished lamely, "—solve some problems in magnesium technology."

Wrist projectors were fired up. Holos of family. Holos of friends. Holos of conservatively groomed guys.

"Do you have a picture of your guy?" asked Immaculata.

"After we eat," said Nanoannie.

Nanoannie bolted her two sandwiches. Sekou wasn't her boyfriend, of course. Didn't even know her. But he would be attracted to her, surely. She excused herself and took her puter into Zloty's room.

Ignoring the room's diaper and baby-powder reek, she distracted Zloty with Fuzzbutt and a holo mouse.

She found age-progression software on Marsnet. Starting with the photo of Sekou and Kapera, she morphed the precocious-looking little boy into a strong-jawed, serious youth. Unsure of his age, she made him half a mear her senior.

"What N'annie do?" asked Zloty.

"Kitty is getting into your toy box. Watch Kitty," said Nanoannie.

Gestures and speech were harder. Using snippets of Kapera's voice she masculinized and aged Kapera's idiosyncrasies.

She dressed him in lab fatigues. No, that was moronic. Hempjeans. Super syncky muscles rippling under sleeveless vest. Not musclebound. Too Terran. She added touches from an image of Kapera's father, leaving out the scars.

She rifled her memory banks for a parting word that Sekou, her Sekou, might say to her, his babe. All she could think of were things Kapera had said, and finally, because Zloty was driving her crazy, she downloaded a snippet of Kapera's speech: "I've got to find my folks."

Sekou would have Kapera's accent. The software put it into a gravely young man's drawl.

She added "Catch you soon, hot-tanks."

Zloty asked, "What's hot? Daddy cook potato?"

Nanoannie forced her attention to Zloty. "The kitten. Fuzzbutt is hot stuff. See?" She downloaded a holo of a butterfly, and Fuzzbutt went wild.

Zloty loved it.

Sekou's eyes were dark, and his lips curved as he said "Hot-tanks," but then showed his serious side when he mentioned his parents. She'd persuade Kapera to introduce them, and she'd take it from there. A Sagan City club, music and hallucinogens—

"Catch you soon, hot-tanks."

Pajama party.

She was ready for it now.

* * *

Chapter 8
Renegade Nuns

Somewhere under the City, Summer-April 12, 2202:

Dear Sekou,

That was scary.

Lots has happened in the last little while. Something blasted a crack in the New Pyramid.

A brick slammed into the floor, right at my feet. Almost hit me on the head! Then another, behind me. The pyramid was falling apart.

Cayce grabbed my hand. Yanked me through a door I hadn't seen. Down, down, down a corridor. Through an airlock. Down a steep slope, then suddenly into an unfinished corridor, just formed from thermoglass, no light fixtures or heat tube covers yet. Using his thumb light, we kept running, or rather he dragged me. My feet hardly touched the ground. I fell.

He threw me over his shoulder.

"Put me down!" I was going to have an accident for sure. Then I spied a lavatory. The air and heat were on, so I figured the plumbing was working.

Then I had a horrible thought. "Was that an Marsquake? Are we trapped?"

"Rocks-for-brains little sand-rat! It's renegade nuns! They're attacking again."

A different kind of nuns? No time for theology lessons. I made like melt water and ran to that bathroom.

A siren screamed.

Hardly finished, I ran out. Cayce was gone. With his thumb light.

I'm alone. Can't see. What should I do, Sekou?

Follow the wall to to the next airlock? Surely I'll find a lighted corridor.

Or maybe one without oxygen and heat.

Cydonia Research Institute, Summer-April 12, 2202:

Sekou, what have I gone and done?

I walked awhile, following the wall. I figured if I always went to the right, I'd for sure not get lost.

Crying is useless, as Mother says (she is right *occasionally*). But just as I ran out of patience, I felt something.

Vibrations. My hoodoo. My specially slick and extra-good hearing, Sekou. The walls buzzed, ever so faintly, with moving people and robots and water.

Sometimes I feel wind, or water melting underground. Sometimes I hear my breathing and my heart, bouncing off layers in the ground. Daddy calls that divining.

I felt robots, rovers, people arguing and lecturing and playing.

I put my ear against the wall in one place, then moved ahead a meter , to see if it changed. Like stereographic hearing, know what I mean?

Sekou, don't leave me. I know you're not there, but don't leave me. ~~We~~ I have to find Mother and Daddy.

I followed people-noises.

All the while I snuck along that wall, I also chewed over what I'd do if I found the Facers again. I couldn't get by all alone, but I was leery of being "important."

Suppose I find Cayce. Should I get in his face cause he left me on my lonesome? Maybe he had a good excuse.

Maybe the Facers can help find our folks, Sekou. If I could only get a skynet connection. My com went missing when they took my suit.

Where should I start? Who should I ask? There's that Japanese couple who were buying our pharm. I don't even know their names. The Mormon Jesuits I met back in Sagan City? They asked too many questions, but they seemed nice.

As I walk, I keep wondering what to do. It's airish and dark, and the only way I know I'm in a long hallway and not a humongous room is the echoes.

My eyes want to close and my knees feel like they turned to sand.

But now—are my eyes playing me, or is there light?

This corridor feels warmer. There's a dim glow around the corner, and a buzz of talking .

Somebody is walking toward me.

A little later, another weird place:

Dear Sekou,

The somebody was Crystal Spirit. I didn't recognize her at first, without her habit. The clue was, even in her environment suit she looked kind of paunchy.

Should I stay or run?

Before I could decide, she screamed. "I've found the Visionary Child!"

Now I was the Visionary Child. Oh boy.

Five of them, all in suits, swarmed over me. Crystal Spirit grabbed me up in her arms. How embarrassing! Have I lost that much weight?

"Take her to Dr. Sphynxeye's office!" one nun yelled.

What should I do? There was another boom. And another. I counted five before we got to the office of Dr. Big Head Sphynxeye.

A door slid open and Dr. Sphynxeye ushered us in.

Maybe he was a decent person. I felt sorry I thought he was wack.

Of course maybe he was ushering us into a Mars ambient room where we would all die of skybite, the bends, etc.

No. Dr. Sphynxeye sealed the door, whoomp. One of the big secretary guys tossed environment suits at people.

Everybody was wearing big yellow round hats like salad bowls glued on top of their helmets. I put on the suit they gave me. Way too big, but it sealed okay.

Crystal Spirit's voice came over the suit's com. "The yellow shield is to protect from falling rocks," she said. She waved so I could recognize her. The suits had different symbols on the chest, to tell folks apart. Her symbol was a big T with an upside-down teardrop.

I remembered the name of Crystal Spirit's symbol: an ankh. I tried to catch my reflection in somebody else's faceplate, but I couldn't see my symbol.

I grabbed Crystal Spirit's hand. "I met this young guy, Cayce. He's trapped near the pyramid."

"What?" She hadn't even asked why I was wandering around without the wheelchair.

"Cayce somebody. I'm scared he's trapped!"

"I'll check."

The floor shook and stuff fell from the ceiling. I was so scared. Crystal Spirit came back. "He's not here. How do you know him?"

"Please! You've got to find him!"

Through her face plate, I saw her Face bindi crossing its eyes at me. "Don't worry about him," she said.

But I did worry. True, he had deserted me back there, but he had also helped me. Anyway, he was a human being! I couldn't let him be killed.

The suit com was generic, not personal, so I accessed it easy. I turned on the virtual light display and chirped through several layers.

How to contact Cayce? I looked him up, searching by age (less than ten mears) and first name (Cayce). He came up E. Cayce Jones—an Earth name?

In private mode I sent, "Cayce? You okay?"

No answer.

Then it hit me. The com in the suit interfaced with Cydonia Institute's Com Central. It was more complicated than our family pharm's House Net Com. But in all the confusion, if their Com Central wasn't overloaded with the emergency, I could call anybody!

Nobody even noticed me using the suit com. So I went for it: through their Com Central to Marsnet.

To our home.

Still no answer.

Our cams showed the pharm dead and stone mute.

Now, let's try Nanoannie.

Chapter 9

A Call from the Blue

The two missionaries had colonized Nanoannie's room with mint and bubblegum scents. Three weird printbooks cluttered her dresser, a projection of some guy with a trumpet squirmed up her wall, and two sleeping bags carpeted the floor. Nanoannie bristled at the intrusion of baggage and odors into her personal space. Then she remembered she wanted *friends*. Even religico friends who smelled weird.

Friends who would ask to see the holo of Sekou, her new boyfriend.

The girls seemed out of a historical drama about Earth. Immaculata wore a long fuzzy gown. Were the little red splotches supposed to be rosebuds? What were real rosebuds like, anyway? Like the virtual ones in Nausicaa Azrael novels? The fuzz on Abish's jumpsuit resembled the hair of a rabbit in Borealopolis zoo, or maybe super big mold spores, except bright yellow. Both girls wore fuzzy slippers with floppy ears and glass eyes.

Nanoannie herself liked to sleep in the nude. This might cause problems later on in the evening.

Mormonite Jesuit women in vids always wore lots of clothes. Wasteful, all that cloth. Very un-nuke.

"Oooo, a kitten!" Immaculata dangled a suitliner strap in front of Fuzzbutt. The kitten batted at it and only missed by a little. "These miraculous little creatures show us God's presence in our lives."

She wanted to turn Fuzzbutt off like a thumblight. Miraculous little creatures, hah. Religion just got you freeze-dried and vacuum-packed. Like Facer nuns, who after they died (or couldn't die) haunted invisible ruins all over Mars, luring people into craters, then sucking their fluids. Just people in rovers, though. In aircraft, you were safe. At least in Nausicaa Azrael novels.

Abish winked at Immaculata, probably meaning, *the time is not ripe to hunt down souls and pop them into our collection jars*. Much to Nanoannie's relief.

"So," said Nanoannie. "You have more pictures of your friends?"

Did one of them have a brother? But the brother would be Mormonite Jesuit, and she'd have to listen to this stuff all over again. Being a Mormonite Jesuit was better than being a Facer, but frankly, religion was for other people: Earthers, old people, pharmers trapped in leaky habs.

Immaculata whipped out her holo projector and flicked it on. Two people in staggeringly modest clothing shimmered on Nanoannie's wall. "That's my parents at their wedding."

The bride and groom looked like twins. Twin bundles of cloth. Which was the bride? Better just nod politely.

Another picture: two people in environment suits, holding a trowel between them. "That's them at the Shalbatana Vallis temple raising. My mom was pregnant with my youngest brother. Can you tell?"

When should she show them her doctored-up picture of Sekou? Her mind drifted. Everyone at the daydream dance club ("everyone" being her online classmates) was totally nuked out by her boyfriend. The age-progression had extrapolated his height to 170 cm tall, but she overrode the software to 190 cm. He would sweep her up, doing the Rocker Bogie Boogie, which she had seen in an ad. Galactically erotic. You gyrate in a circle, arms, torso, and head glued to your partner except for explosive jumps. Then you face off and kick-box for five beats.

"—and that's how we ended up here!" Immaculata was saying.

What had Immaculata been talking about? Their vehicle seemed a safe topic. "How is your hopper powered?" Was it too early for her fire up her picture of Sekou?

Immaculata said it was fueled by magnesium, the stuff Nanoannie's parents mined in the southern hemisphere. "It can carry four people," said Abish, "and supplies for 24 hours. We've conducted five rescue missions. Our latest convert was a woman we rescued from a pharm in Milankovic. The Lord sent us to pull her out less than one hour before atmospheric pressure fell to ambient. She knew from that we were a sign from Heaven."

Rescue missions. "You know," said Nanoannie, "my friend may still be back at her pharm."

"When we checked, there were no life signs."

Nanoannie felt sick. "You think she's *dead*?"

"We heard a rescue call from Intercorp. Two different civilian planes answered it."

One of those must have been the one that dumped her home. Was it these very missionaries? Were they playing some sick sadistic game? Nah. But the second plane—how could she think about dance clubs when Kapera was missing?

"Look," said Immaculata, "she must be okay. I admit, it's weird the pharm was deserted—"

"She was supposed to go to Earth with her parents."

The two girls laughed. "That's the explanation, then," said Abish. "Her parents came back and got her and they're on their way."

Immaculata continued, "Is it not wondrous the Lord has sent us these great engines of exploration? Think of the generation starship Utopia is building. We hope that L.D.S. Jesuit missionaries will be aboard when it someday launches."

"Yeah," said Nanoannie. She wasn't convinced. Not of the wondrousness of the starship, not of the excellence of Mormonite Jesuits, and certainly not of Kapera's safety.

"Your boyfriend," said Immaculata politely. "You have pictures?"

Nanoannie's concern for Kapera evaporated. Too bad she'd created only one holo of Sekou Smythe. She eagerly displayed it.

"Oooh, he's cute," said Immaculata. "Kiafrican. How did you meet?"

Kiafrican meant people with African ancestors. But Nanoannie had forgotten to make up the part about how they met. "His sister. The girl marooned at Smythe Pharm."

"Oh! No wonder you're so worried. I'm sure she's okay, though."

Maybe. "My parents don't believe me that something bad happened at Smythe Pharm."

The two girls nodded enthusiastically, as if skeptical parents were endearing.

"Maybe when the storm abates, you could take me back there and we could look for Kapera."

The two girls looked at each other thoughtfully.

Nanoannie gritted her teeth. "You would be angels from heaven to do that." She felt cheap saying that, because she didn't believe in angels, especially the kind that helped find your friend. Or her desiccated dead body. She didn't even entirely believe in sand vampires, the kind that lured you into deserted habs and then sucked your body dry and left you to be found millennia later by alien archaeologists.

The girls looked at each other again. "Our mission includes being a good example of what L.D.S. Jesuits are all about. Since you're a potential convert—"

Don't roll your eyes.

"Maybe we could discuss our mission a little?" asked Abish. "We do so hate to indulge ourselves in purely social ditherings."

"Humor us," said Immaculata.

How long could the night last?

Nanoannie woke on the floor, covered with an unfamiliar sleeping bag: Immaculata's, judging from the minty perfume, now cut with the aroma of sleep-sweat. She raised her head and saw an unmoving holo of Fuzzbutt projected over the sleeping bag, giving her the queasy sensation that she had melted into the floor. She sat up in just bra and panties. Where were the missionaries? Their stuff was neatly packed up, and the room smelled cold.

She turned the holo off, staggered to the bathroom, and collapsed on the W.C.. Had she actually promised to convert? No, just to take a whole bunch of lessons. Why, why in the name of Mars and all his tin soldiers couldn't she at least have been hustled by male missionaries?

Was Mormon Jesuit life worse than a boring future contracted to her parents' corp?

She had talked the girls into taking her back to Smythe Pharm to make sure Kapera wasn't trapped in that rover.

Trashed pharm, breached nuke, hot coolant, smashed lab, redsuit attack. Her stomach contracted. Okay, she'd just look at the rover and come straight back. If the rover was empty, why, Kapera was okay. Sure, she was with her parents.

Once she knew that Kapera wasn't trapped in the rover, they'd drop her back home, and later, when messages came from them she'd not reply. Her parents wouldn't want her to convert; it meant moving to Equatorial City, and Krona would never trust her loose in *any* city.

Her nose told her she needed a bath, but her mind raced as she threw on clothes. In the central hab room, everybody was drinking mint tea. When she was rich, she would import real tea from Earth. And coffee and other hallucinogens.

"Hi!" The two missionary girls sounded like a cartoon chorus.

"Make yourself some salad." Krona handed Nanoannie a glass of banana nectar.

Nanoannie went into the kitchen. How would she squirm out of the religion lessons? Maybe she could crawl under a rock, like the nanobacteria everybody thought she was named after.

Escudo pulled a casserole from the microwave. "How about some hot breakfast?"

Her very favorite. "I hate poached endive," Nanoannie said flatly. How was she going to avoid the religion lessons? "Is the storm still going on?"

Krona emerged from the pantry. "Here, hold your hand under this faucet." Krona was surprisingly strong for a woman twenty centimeters shorter than Nanoannie.

The red drizzled a pink stream into the basin. Nanoannie thought about shrieking, "That's blood, Mom! I just happen to be *bleeding to death*!" But was it blood?

"It *is* coming off," said Krona. "I spent an anxious night. Despite what those girls said, I worried you had gangrene from the skybite."

"Isn't gangrene green?" asked Nanoannie

"Black, sometimes. But Marsmed said the flesh can turn fiery red before it begins to rot."

"Rot?" She curled her lip at the slimy endive Escudo ladled up. Gag.

"Yes. We're grateful those sweet girls relieved our minds. I dreaded thinking of my darling child living one-handed in a world where manual dexterity is so important."

Yeah, thought Nanoannie, *and think of the expense of a one-handed environment suit.*

Escudo put the bowls of slime on a tray. "The girls have been discussing some other things," he said. "They said you want to hitch a ride back to Smythe Pharm to look for Kapera."

"I—"

Krona broke in. "You can't. It's dangerous. Those people could have been into anything."

"At the very least, we'll go with you." said Escudo. "Though we're worried about your plans to convert."

Nanoannie let her jaw gape. "Plans to convert? Are you brain-dead?"

"To Mormonite Jesuitism. But we're happy you've found a nice boy." Krona beamed. "When can we meet him?"

"Not so fast." Escudo held up a hand. "If this Sekou Smythe is involved in illegal weapons development, I'll nip this romance in the bud."

"Where did you get the idea you could play detective on me? The Smythes aren't spies! You are!"

Krona and Escudo glanced at each other uncertainly. "The girls were talking, and—"

"And you pumped them for *every-*

thing!" What kind of people were Immaculata and Abish, talking behind her back? And how could her parents listen to such garbage. Convert? Excuse me?

Now they knew about Kapera's brother! And they had the nerve to *judge* him.

She slammed her bowl down and rushed into the living room. Abish was holding something out to her.

"Is this your com?" Abish asked.

It was. How could she have been so stupid? Again! She had left her com in her suit, volume turned way up.

Abish said, "I can't figure out how to turn this off. It's a recording that's been playing for awhile, I guess. Something about your boyfriend. Sekou."

The room turned suddenly icy cold. Sekou didn't know she existed, did he? Unless Kapera had told him, in that diary.

She was at Abish's side in two strides. She grabbed the blaring com with her clumsy skybit hand.

"—aren't going to answer, I'll just do an entry to Sekou. MESSAGE LOOP BEGINS. BEEP. This is Kapera Smythe of Smythe Pharms. Nanoannie, you know who this is. I'm in a fix here—"

"KAPERA!" Nanoannie screamed into the com.

Chapter 10
Cayce

Kapera Smythe, her diary, Cydonia, Summer-April 13, 2302:

Dear Sekou,

What a bodacious com! I set it to broadcast an override-all message to Nanoannie, then went to work finding Cayce. Was he was unconscious?

I had to tell Crystal Spirit that Cayce was out there. She's so super kindhearted she would never let someone be left behind. I looked all over for her, but I'm so cussed short, I couldn't see a lick. All the suits looked alike. I couldn't see an ankh on any of them.

I told myself *calm down* and I tried my broadcast again: "Cayce! This is Kapera Smythe! Are you okay?"

I was ready to give up, when bam! I heard, "Is that you, Tunnel-rat?"

"Yes! Oh, Cayce, I thought you were knocked out and trapped somewhere!"

"Huh-uh. Listen, I need your help. Where are you, exactly?"

"There's this big room behind Dr. Sphynxeye's private office. I—"

"I know where it is. Hey, kid, I need your help getting in. They've locked the doors from the inside. Think you can find a door you can unlock?"

"That would be an airlock, Cayce. The exits I can see are airlocks."

"Yeah. But they're not passworded from inside. It'll take me, lemme see, four minutes exactly to get there. You be ready to open the one nearest the Face."

"How can I tell?"

"The puter in the suit uses the Face to orient."

"Cayce, why not just ask them to let you in?"

"Duh! They're all too busy. Mark the time. Four minutes from now."

Could I handle the airlock? Would anybody notice? I scoped out the airlock I thought he meant.

Cayce didn't fool me with his jive about them being too busy to let him in. I figured he was still on ice and didn't want to face the honchos. But maybe I could play *him*. Goes around, comes around, all that.

Cayce must have been psychic, because he arrived the exact time when everybody's attention was on Dr. Sphynxeye. Sphynxeye was bumping gums about the planet the generation starship was going to, and how they shouldn't lose hope even though it would be a good fifty mears before anybody could actually buy a ticket.

My suit had tag commands for most of the airlocks in Cydonia complex. The airlock worked easy, simple enough for a little kid. They must have a lot of babies because they think the aliens from Yggdrasil want them to go forth and multiply throughout space. Starting with Mars. That's also why I saw folks with poor vision—even his honor Dr. Sphynxeye. The Earth Facers were spending money like it was fines to send people here, and didn't care if they passed the astronaut tests. They wanted them to breed lots of little Facers. I was probably wearing a suit that one of the kids had outgrown.

I got the airlock open and let Cayce in just as the lights came back on. Did I mention they had a power failure? The air handlers even stopped! Boy, was I shaking. Renegade nuns must have toasted the solar power but the complex must have a nuke back-up, like normal folks.

I asked Cayce, "Why'd you leave me alone in the dark?"

He rapped his knuckles on my helmet. "Aw, I figured you were a smart little kid. You were only a hundred meters from a common area. I knew you'd be okay."

"But why'd you run?"

"Like I told you, I wasn't supposed to be near the New Pyramid."

Cayce wasn't in a suit, so evidently that area hadn't been breached. He went to a locker for a suit.

I followed him. "Hey, Cayce!"

He turned around. "Yeah. What do you want?"

"I want to get out of here."

He slithered into the suit. "Out of Cydonia? Where would you go?"

"I have a friend. She'll take me somewhere safe."

He flicked his helmet com on private mode and stooped down to flash his pearly-whites at me. "Safer than here?"

"I reckon. I'm not afraid of those renegade nuns, or whatever they are. I just want to find my folks."

He peered at me. "What's wrong with you, anyway?"

"Uh, it's called leukemia. But I'm okay, for true." Sort of.

"Oh. Leukemia. There's a lot of that going around. My sister got that last mear. They used crystal therapy on her."

"So what happened to her?"

"I just thought of a way to get you out."

Change of subject. So I had an idea how good crystal therapy is. So much for the great tricknological lore from a "civilization more ancient than Earth."

First task: find our folks. Then Earth orbitals, quick as Deimos.

Cydonia Institute environs, Summer-April 14, 2202, stone early in the morning:

I'm out in the environment. Nerves humming, foot tapping.

Cayce knows all the tunnels and corridors in Cydonia station. He was born here. His stories about his family keep changing. A player for sure. But I won't look a gift rover in the head lamps.

But Sekou! Nanoannie was so *funny*. I was writing to you when bam! her voice breaks in—I had my com open so I'd hear her the minute she got my override-all. She screams, "KAPERA!" and then, "Where have you been? What happened? Was that a message to Sekou? Did you tell him about me?"

"Calm yourself," I said. "I'm safe. How about you?"

"I'll tell you everything. You want to be rescued?"

"Uh—sure. But how?"

"Don't know. Maybe these missionaries. Let me think. Are you being held captive?"

"Sort of. There's a landing field here." I sent her the APS coordinates.

When she saw I was near the Face, she almost went global. "Don't you know Facers are *dangerous*? Haven't you ever read *The Facer Nun Who Couldn't Die?* Some of them are practicing vampires!"

"I don't have much choice, Nanoannie. Plus, they seem kind. They even gave me some medical treatment. Did no good, but their hearts were in the right place."

"No, they aren't! They'll use you, then you'll be meteor sploosh!"

"Then can you bust me out of here? Oh, Nanoannie, I feel like a mouse wearing a tiger disguise. They're under attack. And I'm scared they want me lure my folks here. Some kind of research my mother was into."

"I bet that's why they were searching your pharm."

"Might could be. But one thing doesn't add up. They act like they don't know where my folks are. So how can they be the ones that kidnapped them?"

"Let's figure that out once you're rescued. Kapera, I'll get back to you, I promise. No lie, I give you my word. Be ready."

I wasn't crazy about going back to her parent's pharm. They seemed a little cold to me, and I didn't like being an uninvited guest. But maybe I could hang awhile with those missionaries she mentioned. I figured I'd maybe get a private detective and find our folks.

Cayce had warned me the Facers run AI functions, listening to com messaging in and out of the institute, because of the renegade nun attack. I asked if they would be alerted to a marsplane landing. He said they fly an unpiloted weather mission every two hours. If a small marsplane comes in at the same time, the AI will register it, but the actual human monitors will think it's software stutter.

So I told Nanoannie please, please tell my ride to come at two, four, six, eight, or whatever.

Out here in the environment, with the Face like a dark mountain in the near distance, I get a touch nervous. Sure, Nanoannie interfaces with too many Nausicaa Azrael stories, but still, there's something scary about standing around with nothing overhead except the stars, plus Deimos rolling across the sky.

Who will Nanoannie send? Those missionaries she mentioned, or her folks, or that corpgeek that's always visiting her pharm, Elvis Darcy?

It's been over eighteen hours. What if they got lost? What if she decides to fly here herself, and she's not as good a pilot as she thinks she is?

What if she got scared of zombie Facer nuns and just forgot the whole thing?

* * *

Chapter 11

The Eye of the Storm

"Hand me that com, young lady," said Nanoannie's father. "I'm not saying Kapera's a bad child, just a little too imaginative."

He was *completely* out of control. "Kapera needs help!"

"She's still at Smythe Pharm?" Krona came in, holding the dish cloth which she had been inspecting for Mercurochrome stains.

Nanoannie ran into the bathroom with her com and locked the door. She sent a reassuring message to Kapera, found the APS coordinates where she was captive, then clipped her com on her collar and emerged.

"We have to go rescue Kapera." She had to be calm, not let them rattle her.

"Where is she?"

"The Facers have her, didn't you catch on?"

Immaculata watched curiously. Would the missionaries take sides? If so, whose side would they take?

Escudo and Krona wouldn't be happy about a rescue mission.

Immaculata said, "Facers. Their religion certainly violates the truth of the Gospels as we know it. They might be dangerous."

"Might?" Nanoannie oozed sarcasm. "They practice vampirism, right?"

The girls looked at each other. Immaculata said, "Actually, that's just a trashy story somebody wrote. But they are basically Godless, in the sense we know God."

Abish said, "They worship a graven image. Or maybe not even graven, maybe it just happened."

Krona dropped the towel into the keeper. "But she's safe and warm and has air to breathe, doesn't she? N'annie, your little friend is okay for the time being. When her parents come back, they'll retrieve her and be grateful that she didn't die of sky exposure."

Nanoannie tried not to roll her eyes.

"You're all missing the point. Kapera is being held captive. The Facers kidnapped her parents and now they have *her*, too."

"Did she say she was being held against her will?"

"Yes! Wake up!"

Escudo said, "That's bad. We'll notify the authorities right away."

"Right away is not soon enough! The authorities let things just—fester!"

Krona started to put an arm around Nanoannie, but Nanoannie jerked away. Krona said firmly, "It might take a sol or two for them to pick her up, but Mars alive. This is not an emergency. The Facers are not vampires, no matter what silliness you've been reading."

"It's fiction," agreed Escudo. "Let us talk to Kapera and find out—"

"No! You aren't thinking! She has to maintain com silence. They're monitoring communication."

"Well," said Krona, folding her arms, "what do you want us to do?"

Nanoannie suppressed her exasperation. "Maybe Immaculata and Abish would fly me over there—"

Abish winced. "It's pretty dusty out there."

Actually, Nanoannie could see the sky clearing through a cam window in the ceiling. She wavered for a minute, then said, "They could fly through the storm. It isn't global."

"Yet," Abish said.

"Or we could take the rover."

Escudo shook his head. "What grade did you get in Areography? The Face is down in the temperate zone, halfway around the planet from here."

Always putting her down! Next they'd start yapping about how Zloty had scribbled some blob in her baby food that looked like a rover, what a genius.

"I *know* that, already. But we'd *still* probably get there before Intercorp Police. They're useless!" She hoped nobody asked her for an example of their uselessness. True, they hadn't located the Smythes, but somebody—if not the Intercorp Police, somebody under their direction—had brought Nanoannie home.

But they couldn't take Kapera home, because Kapera didn't have a home.

Krona said quietly, "We don't have equipment or training for a rescue mission. And I'm not sure Kapera needs to be rescued. I'd like to talk to her before we do anything."

"You don't *trust* me!"

Krona looked at Escudo. "You get carried away sometimes. Remember that nimp we rescued you from."

"It was perfectly safe. I wasn't going to actually *do* anything online." Again, this wasn't strictly true. But she never went to any of the pay sites. The nimp had said he'd get her a completely legal, safe job, just talking to guys. She could always turn them off if they got too sexual. But her parents had to go and complain and get her barred from a whole category of sites, just because she was pre-ten.

She blinked. *Actually*, said a small voice in her head, *they* did *rescue you. You were way out of your depth.*

But still. They spied on her. Told on her. Tried to control her life.

Escudo grinned nervously at the two missionary girls. "Nanoannie is a sweet girl, but she likes adventure. She gets in over her head."

The two girls nodded sympathetically, and that's when Nanoannie lost it.

"I need to be alone," she said. She grabbed her still-dusty suit, and made for the labs.

"What do you need your suit for?" asked Krona.

"To figure out how to fix my glove," she said, and stormed off.

The lab was dark and smelled like ozone and machine oil. Her parents ran magnesium experiments here, though most of their serious work was done at Plantation Centime, at Hellas Basin, other side of the equator. Nanoannie pulled the suit on, wrapped another twist of duct tape around the damaged glove, and settled her com in her helmet. Through the mirror sky light, she could see the *Origami Firefly*, the prettiest vehicle in the universe. She had learned to fly when she was only four mears old. She hated the fact that they would teach Zloty to fly in a few mears.

The *Origami Firefly* was in its horizontal configuration, solar cell membranes extended. The wings drooped, gleaming softly. They weren't getting a lot of sunshine during the storm, but it was fully charged, because it hadn't been flown in a while.

The Centimes sometimes brought the *Origami Firefly*'s engines in to tinker with and try new fuel formulations. It was an experimental aircraft.

The lab complex had an airlock to move equipment in and out.

Her heart was still pounding from the argument. She knew she shouldn't go out in the environment alone, but her suit was a good one, and her APS and other AI functions were state of the art, the best credit could buy.

Still. Was she making a mistake? *All juiced up on rage and righteousness*, said that little voice in her head. But she'd promised Kapera she'd rescue her.

Flying the marsplane in the dust storm was no big deal. She'd reconfigure it for vertical takeoff, then use instruments to punch through the dust. Somewhere between here and Cydonia, the atmosphere had to clear up.

She checked Mars Global Weather. Yes. It was clear two hundred kilometers around Cydonia. She'd come in from the west, and landing would be easy.

Sure, if the weather changed, she'd have to do an instrument landing, which would be wicked.

But she'd landed on instruments, at least twice. Once she'd landed in vertical configuration, although not during a dust storm.

The *Origami Firefly* was charged and ready. It wanted to dance.

The cockpit seat hugged her like a silken glove. She started the reconfiguration protocol and leaned forward, anticipating the hydraulic tilt of the plane's body. It shifted like an animal suddenly alert to prey.

"Beautiful, beautiful baby," she told it. The instruments hummed, alive and ready, under her hands. She could fly it just through the controls on her com, if she wanted. She was good, the plane was good.

Ready. Flicking on outside cams, she suddenly saw them: four figures on the ground, running toward her. It hadn't taken them long to suit up. She picked out Escudo and Krona from their familiar, expensive environment suits.

She stared in horror. What should she do? She had to rescue Kapera. What would they do to stop her?

Her heart pounded like flickering frames in an old Earth movie. She slammed home the manual toggle that sealed and locked the cockpit.

The engine-side camera revealed two of the figures sprinting toward the *Origami Firefly*.

"Stop!" she commed them. "I don't want to fry you!"

If she didn't do it *now*, they'd be in the stream of the exhaust.

Now! She took a deep breath and fired the ignition.

The *Origami Firefly* was a hybrid, which meant that it used a magnesium fuel for vertical takeoffs and landings, and also did prop flight, fueled by hydrazine refined from the atmosphere by its enormous solar-cell wings, which were also aerodynamically functional.

The four figures on the ground halted, then her father began jumping up and down and waving his arms. Then he led a charge away from the *Firefly*, and behind a large rock pile.

Once aloft, she realized what she'd done.

Of course, she could just fly back to Centime Pharm and pretend it was all a gag.

But that would be pretending nothing

had happened to Dr. and Dr. Smythe, to Kapera, to Sekou, and to her. She had been gassed and abducted. Even if the perpetrators dropped her a kilometer from her own home, that didn't erase the fact that something mysterious, something sinister had happened.

She couldn't just cower in her own hab. She thought about that corp rep, Elvis Darcy, always sniffing around. She suspected he packed a weapon of some kind. Suppose he came around and did to her parents and her and little Zloty the same thing somebody had done to the Smythes?

Maybe that was far fetched. But she couldn't just lie around the pharm waiting for trouble. She had promised.

She was a woman of action.

Taking the *Origami Firefly* up without checking it out was not entirely wise, she realized. She knew she was heedless. On Earth, planes crashed and burned. She doubted the *Firefly* would burn in Mars' atmosphere, but the impact would still kill her dead if something was wrong.

She needed to get to Kapera fast. Some quick calculations satisfied her she could easily make it to Kapera, land, take off again, and get to Centime Plantation in Hellas Basin before she ran out. She'd even be able to do some detours, if Kapera wanted to nose around looking for her parents. But for best fuel economy, she'd use the prop mode aloft, and land in prop mode, too.

She hoped the Facers had a long air strip.

An hour later, her com beeped. It was her mom. "Darling? Nanoannie? This is Krona. Dear, what in the world got into you? There's a storm out there. You can't fly instrument. You don't have enough hours in."

Nanoannie gritted her teeth. She remembered the missionary girls' hopper. Would they take off after her, try to catch her? And what if they did? She'd lead them a hot chase.

Escudo's voice came on. "Little lady, you are in big trouble. No more net dates for you. No fooling around with guys in virtual clubs. The only boyfriend you'll have is your cat. You are *grounded*, and I mean *underground*. Confined to your room, you hear? Until the end of Summer-May. No entertainment except for on-line school!"

She wavered. "What if I come back right now?"

Long silence. Probably plotting against her. "We'll only ground you until the end of this month."

A trick. They would never let her out until time for her to ship them off to the old people's hab. Until then, they'd turn off all her toys and reprogram her com so she could talk only to her teachers.

They didn't care about her. They didn't want her to grow up, or have friends, or ever *ever* have a boyfriend.

Dust flowed silently over the *Origami Firefly* like amber smoke. The Sun glowed dimly to port. APS was working perfectly. It was a beautiful morning, a beautiful *cloudy* morning.

And she had a mission.

She said, "Listen, our neighbors were kidnapped. Don't you *care*? I mean, are you totally *heartless*?"

Her father's voice softened. "You know, the plane isn't really ours. Everything we own belongs to Utopia Limited." Was he talking to her, or to Krona?

So that was it. They wouldn't report her to Intercorp because if they did, they'd have to say she *stole* the plane. Then Utopia Limited and its gray minion, Elvis Darcy, would "detain" her in Utopia Limited headquarters. A fate worse than spending the rest of her life in her bedroom with no net access.

Krona's voice resonated with fear. "Please come back, N'annie. We won't do anything. That little Smythe girl—she'll be all right. She's safe where she is. Please."

Nanoannie slapped the com off.

* * *

Chapter 12
Flying

Cydonia Institute environs, Summer-April 15, 2202, early in the morning:

Dear Sekou:

We're flying.

Nanoannie is cool. She can program this plane to fly just anywhere, and she bent my ear with the history of hybrid planes.

We're so high, I think we could fly right over Olympus Mons. I saw a hab a few kilometers back. Looked like a baby-toy.

The institute looked like a sand castle in a sandbox. The Face and the City just looked like heaps of stones. But as we gained altitude, I could see why the original Facers from Earth decided it favored an alien mask.

But let me start from when Nanoannie landed.

I was standing by the institute airstrip, wishing my suit would warm up. It was getting toward dawn (at this latitude, the sol is almost fifty-fifty between light and dark), and I was yawning and shivering. Out in the environment about a hundred steps from Cayce's secret hab exit, I could see all around. I wasn't even sure what direction Nanoannie would come from.

While I was scanning the sky, I felt a rover rumble up behind me.

Where could I hide? In the shade of a big rock? If I hunkered down and crawled I'd freeze to the ground.

The rover stopped.

A figure in a red suit got out, and I figured, I'm meteor sploosh.

But guess what? It was Cayce. Through his helmet, I could just barely see his Face bindi. With its eyes and mouth closed, it favored a bump on his forehead, from falling downstairs.

"Thought I'd see if you need anything."

Well, Sekou, what if I did? Would he bring me a bowl of that insulation and yam mess? Like I could eat inside my suit? "You could tell me if you've figured out anything from Nightwatch." That's all the cams and telescopes the Facers train on the sky hoping the Builders of the Face and City will come back. Cayce could patch into the Nightwatch transmissions—everybody in the institute follows it.

"Packed you some sandwiches. And this." He smiled this shifty smile. "What'd you call it? Hyper-K? I took a sample. Knew you wouldn't mind."

I do not go around hugging strange eight-mear-old men, Sekou, but I couldn't check myself.

I said, "The big fungus is called a mother shroom. The little piece is a baby. You have to add sugar to feed it."

"I gave it to my sister to take care of. I'll tell her that."

Cayce sure has a lot of sisters.

I noticed a flash. Lightning? There wasn't that much wind.

I turned on the suit's binocular function.

A plane. The wings dipped with thermals and updrafts, and shimmered, reflecting starlight.

"I hope she doesn't mess up landing," I murmured. But she wouldn't. It was just that the wings are so limber and long they wave up and down with the motion of the plane's fuselage.

The plane made a pass over the landing strip—checking it out—and then made a humongous circle in the sky, came around, and touched down, bouncing like a skippy-ball. She taxied to a stop a long ways from us.

"I figured you didn't want to walk," Cayce said. His com voice sounded comfortable and close by inside my helmet. "Get in."

Then Nanoannie's voice, nervous as her cat: "You sure flight control here is all robotic?"

Cayce laughed. "Sure. It might have alerted a human, but probably not. Weather drones come in and out at this hour." Then, to me: "Get in, Tunnel-rat, unless you want to walk."

His rover bumped over the field right up to the plane.

I didn't realize how pretty the *Origami Firefly* was. Its wings are translucent, iridescent indigo from underneath. The joints where they fold up are so fine they're invisible. The propeller is shiny gold stuff, thin but stiff, like big paddles, or sharp spatula blades.

Nanoannie climbed out a hatch and tied the plane down. It's so light it might blow away without a pilot's weight.

Then she held her hand out to Cayce. Her other glove was fixed with tape. She didn't seem hurt, thank the stars. She's tough. Tougher than me, for sure.

"Are you Sekou?" she asked.

Say what? She was talking to Cayce.

"Who's Sekou?" he asked, as if she was completely wack.

I started to explain about you, but Cayce interrupted. "I'm Cayce and I'm coming with you. To find Kapera's parents."

Nanoannie's body sagged. What is this thing she has about you, Sekou? Does she think she's going to meet you? I'll drop the whole story on her, first chance I get.

Mother has a term for girls of about eight mears old: "hot pants." Nanoannie shook Cayce's hand, an awkward hand-bump between two stiff gloves, hers all wrapped with tape. She was trying to figure out what Cayce looked like behind his faceplate, and under his suit.

I promise you, Sekou, I will never become so hot-blooded that I stand out in the environment trying to figure out what some stranger looks like under his clothes.

She said, "You're not coming with us."

"Hey, hey! I'm an ace areographer. I'll find Kapera's parents."

Nanoannie struck this attitude, "Yeah? And how about murderology? I bet somebody right here in your Facer Institute killed Kapera's parents."

I didn't want to hear any more. "They aren't dead!"

Cayce said, "Maybe they left Mars without you."

"No! Forget that! I don't know why they disappeared, but they must have had their reasons."

Cayce said, "Then why would they disappear?"

"Dr. Sphynxeye must be right," I said. "Somebody wanted something in their research."

Cayce pointed a finger at me. "That's why you need me. I belong to the institute, and we're independent of the corps. You can't trust anybody else."

Nanoannie pointed a finger right back at him. "Yeah, and tell me why we can trust you. Your Facer buddies were probably the ones that gassed and kidnapped us. Otherwise how did Kapera wind up here?"

Cayce's voice sounded super strained. "First off, we consider the slang term 'Facer' insulting. So watch your mouth, you overgrown tunnel-rat. Second off, we are independent of any corp and our knowledge is for the betterment of all humans. Unlike the Mormonite Jesuits, who have friends in all the big corps."

Nanoannie got nasty-quiet. Even through her helmet, I saw she had turned into that lion person she is when she gets mad.

"Even before your 'first off,' you Facer poseur, I consider being called a tunnel-rat an insult. If you mean hamster, we don't even have hamsters at our pharm, because we are rich enough to get our protein by trade. And there is nothing wrong with being a corp hire. My family—"

To cool things down, I said, "You don't want to take Cayce with us, then?"

She shook her head as if to clear it. "We can't. The plane only carries two."

Say what? A minute before, she was looking at the guy as if she wanted to tear his environment suit off him and do the nasty with him right under the sky. Then she picks a big fight with him. Then she turns totally rational. Is this puberty, Sekou? Is that what happens when your hormones get revving?

"Okay, I understand." He stuck his hand out again. "Didn't mean to go off on you. Everybody gets the wrong idea about the institute. It's because of the renegade nuns."

Nanoannie stepped back, almost falling over a rock. "Facer Nuns? That's not just fiction?"

"They want to launch a starship within a mear. Crazy jive idea. They're tearing down everything Dr. Sphynxeye's scientists have built up."

"Are we safe? Could they know we're here? Could they follow us?"

"The renegade nuns? How they could know?"

Well, Sekou, I figure they had to know about me, and that was maybe why they blew up the New Pyramid. "I bet they're watching right now."

Cayce said, "Unlikely. But if you stay here, they'll grab you. If that's what they're after. You'd best bail, real quick. Trust me."

Nanoannie cocked her head, not easy in an environment suit. Looking him over again. "So long, Cayce. Sorry I went global on you. It's been a hard sol. Piloting is not as easy as people think."

I didn't have time to tell Cayce how to grow his Hyper-K starter. He looked tall and skinny, like a stickman standing out in the dawn environment as I looked back from the cockpit of the *Origami Firefly*.

Chapter 13
Two Heaps of Rock

With Kapera safely beside her in the *Origami Firefly*, Nanoannie felt fine. Her nerves hummed. She had flown all night, letting the autopilot take it for two hours over the vast emptiness of Utopia Planita. Sometimes she could go for sols without sleep, then sleep round the clock to make up for it. Once she read about this guy in love—not a Nausicaa Azrael vid, something print only, without dramatization, so she put it in her reader and listened when she couldn't sleep. The guy in the story couldn't sleep either. So maybe that was what love was about.

Seeing that guy Cayce with Kapera shook her up. There they stood, less than a kilometer from the Face. The real actual Face—it shriveled her veins and chilled her blood. But was it the Face that jolted her?

Nope. The shivers came from thinking—*oh, that's Sekou, and here I am in a dumb old Luna-made environment suit*. She wanted to be dressed for a club, in a skintight black number with pop-buttons all the way up the leg. And makeup. Big dark eyes, lashes tipped with sequins. Hair gilded, maybe in dreads, like Psyche Leptonne, the actress that played the vampire huntress.

"What was that bump on that guy Cayce's face?" An early symptom of sand vampire infection?

"A Face bindi. Where are we going?" Kapera asked.

"I don't know. " Yeah, where to, now she had rescued Kapera from the Facers? Possibly to Hellas for more fuel, then to a big city with clubs. "What's a Face bindi?"

"I need to find my folks." Kapera sounded tired.

Nanoannie flashed on the video of Sekou, saying, "Later, hot tanks. First, I've got to sift the fines for my folks." Only, was that what he really said? She had almost forgotten that she'd created that video herself.

"So how do we look for them?"

"We could go back to the pharm."

Nanoannie felt distinctly sick. "The last time we were at your pharm, somebody gassed us."

"I know. But those guys couldn't have been all bad. They did take you home. Anyway, I think they were searching for something. They'd be gone by now."

"Anyway, there's a dust storm."

Kapera was silent for a minute, accessing Mars Global Weather. "It's dying down."

"I wish we had guns," Nanoannie muttered.

"We have coms. We can call for help if we get in trouble."

"Yeah? Who are we going to call? My

parents' corp is won't be thrilled that I took this plane for a joy ride, and you don't have a corp. My parents—well, they just have a dinky old pharm rover they use for hauling."

Kapera was silent, and Nanoannie's nose started itching again. Then Kapera said, "It's a shame we can't convince anybody to help. Like your folks, or those missionary girls you told me about."

My dumb parents, thought Nanoannie. "If we can't find your parents, what will happen to you?"

"I guess I could go back to the Facers, but I'd rather the Mormon Jesuits would take me in."

"So, why don't I fly you to Sagan City, and you can talk to them?" Sagan City had a lot of nuke party life.

"Um, well, see the last time I went there, I dropped this line on them and said I was my brother. Then they tried to send me back home, I ran off. They just might not trust me."

"Huh? How did you convince them you were your brother?"

"Without his last name they couldn't check his ID or age. I lost my hair, so I look—what's the word—like I could be either boy or girl."

Nanoannie was impressed. "You did that? You could be an actress!"

"In one of your Nausicaa Azrael vids? I'm not womanish enough. No backside, no tanks to speak of."

Nanoannie smiled secretly. She herself had tanks, nice ones, she thought. Not super huge, but those vid-makers always used enhancement software. She once caught a glimpse of Maha Sweeshi in a Borealopolis restaurant, and she wasn't near as hotbodied as she looked in the vids.

"I could eat the wheels off a rover," said Nanoannie, several hours later. "We could pressurize the cabin and have lunch, only I forgot, I ate the plane's emergency stash and there's nothing else on board."

"We can pressurize?" Kapera asked "Let's see what kind of sandwiches Cayce made us."

"Sandwiches? Cayce made sandwiches?"

"Yeah, and he put them in an insulation pack, so we wouldn't chip our teeth on them."

Nanoannie thought about sandwiches. She thought about all the different types of bread that might be in those sandwiches—quinoa, winter wheat, sprouted rye—and the fillings—potted cuy, chlorella paste, maybe even real chicken, or freeze-dried ham imported from Earth. After all, Facers were supposed to be rich. But she still wasn't sure about Cayce. Was he a hot guy, or was he one of those Facers that suddenly turned on you, like in Nausicaa Azrael vids? And why did Kapera change the subject when she asked about the bump on his forehead?

Kapera said, "Might could be we should eat before we land at my folks' pharm. The hab is cleaned out, and even if there was something, it's probably all raggedy radioactive."

"You still think we should go back there?" There was time to change Kapera's mind.

"You don't want to, huh?"

Nanoannie didn't want to admit she was scared. "Are you super hungry?"

"I'm never much hungry any more. But we should eat."

"Cayce packed the sandwiches. You think Cayce is an okay guy?"

Kapera shrugged, a gesture barely discernible in her environment suit. "He stood by me."

"He's a Facer."

Kapera sighed an exasperated sigh. "Oh for Mars' sake, Nanoannie. He isn't going to poison us."

Nanoannie thought about the sandwiches some more. Pressurizing cost energy. But it was morning. They had all sol to collect solar energy, make more fuel, and collect more oxygen to pressurize.

"I have a thought," Kapera said.

"And that would be?"

"Isn't there a IR camera on this plane?"

"And you think—"

"We'd have to adjust for the nuke. But if there's anybody at our pharm, or even if anybody has driven a vehicle there recently—"

"I see what you mean." Nanoannie wondered if sand vampires had heat signatures. She wasn't hungry any more. Screw the sandwiches.

No. Of course no heat signatures. That was the whole point of sand vampires; they stuck around waiting to suck moisture *and* heat from travelers.

She was not about to point this out to Kapera. If there was anything she hated, it was having some little kid sneer at her for being superstitious.

Of course she *had* seen an infovid on the Inquiring Minds network about evidence that sand vampires actually existed and that somebody—Queen Victoria I? had been secretly warned about them.

But she still wasn't about to mention it to Kapera. How humiliating to have a little kid patronizing you because you had an open mind about mysterious beings.

Would there be pain while a sand vampire sucked you to death, or would you just fade away? Nausicaa Azrael showed her victims thrashing around, but they might have been having orgasms.

She wouldn't enjoy an orgasm if it was part of being killed.

What would they look like? Could you detect them other than by heat signature? Motion detectors? Would they be immune to radiation? She had heard that old-fashioned Earth vampires, which she most certainly did not believe in, were repelled by religious symbols. You'd have to figure out which religion the vampire belonged to. If it was a Facer, for example, you'd have to be lucky enough to have a Face on Mars medallion or T-shirt. Other religions? Mormon Jesuits had crosses. But sand vampires (which maybe didn't exist, but maybe did) had been around since before human religions came to Mars.

Unless the Facers were correct, and the Face was an ancient monument. Maybe aliens built it when sand vampires were first spawned! So a Face on Mars image was perfect to repel them.

She wished she could talk to some open-minded person about this. Not Kapera. Maybe that Cayce guy.

Kapera suddenly spoke up. "This plane's puter will do sonic analysis, won't it? I mean, filter out our landing shock wave, wind, normal sounds from the labs and hab? Then we could detect even non-nuke robots."

Nanoannie grinned foolishly. Of course! Even sand vampires had a sonic signature. "Good idea, hab-rat."

"We'll have to land in order to use that, but still it's a good early warning system."

"Yeah! Excellent idea."

Kapera looked thoughtful. Then, "Of course, they could be standing still. I mean, for an hour or so. A human couldn't do that. But a robot—"

Or a sand vampire.

Kapera sighed. "I could also rely on my hoodoo."

Nanoannie believed in hoodoo less than in sand vampires. She set up the parameters for the IR cam and sonic analysis. "You think your hoodoo is supernatural?"

Kapera said, "Huh-uh. I just have extra good ears. I can hear people talking even out in environment suits. From vibrations that go down their suit circuitry to the actual ground. I'm sure that's it. I don't believe a lick in the supernatural."

"But 'hoodoo'—isn't that paranormal?"

"Maybe. My father named it hoodoo. He says there are ghosts from the early explorers. But I think he's jiving. He's a scientist. Still, if you're a scientist, you don't rule things out."

"If there were paranormal presences—you know, ghosts—at Smythe Pharm, could you hear them with your hoodoo?"

Kapera gave her a quick glance and then said, kind of muffled, "Sure. I could tell if there were supernatural things at Smythe Pharms."

They flew on in silence. Nanoannie spotted a flat area to land.

"What do you think?" she asked.

Kapera had her helmet pressed against the cockpit window. "Think? About what?"

"Do you sense any paranormal presences?"

"Say what? No, I don't feel anything." Then, "How about the IR and vibration analysis? For stuff besides ghosts."

Nanoannie checked, "Silent as the grave."

Kapera said, "I wish you wouldn't use that expression."

"Okay. Silent as a midsummer nudist camp party on Phobos."

"So you're going to land?"

"Right. Hold on and keep your hoodoo handy."

Kapera muttered something unintelligible.

The plane com gave an analysis alert.

Nanoannie flicked on the interpreter. *Regolith anomaly*, it said. She accessed its analysis. It was comparing its previous view of Smythe Pharm to this present one. And it had found an anomalous cairn of rocks and dust.

She scanned with her own eyes.

"Kapera, look," she said. "What *is* that?"

Kapera said, "I don't know. We've got to land and look at it."

"What if it's sand vampires?" The minute the words were out of her mouth, she knew how ridiculous she sounded.

"Sand vampires," said Kapera reflectively, "wasn't there a video about them? Something about a woman called C. L. Moore?"

"Never mind!" Nanoannie scanned the com data. Since she had left Centime Pharm, the com had shown a little image of her parent in the corner of her screen. If she didn't repress the image every few minutes, it would burst into life and plead, "For stars' sake, Nanoannie! You'll ruin Zloty's birthsol. Stop acting like a child and come home!"

Maybe APS had informed them she was nearby. They probably hoped she'd come back with the plane. They probably were afraid she'd wreck it.

Were other parents like Escudo and Krona? Fearful and suspicious, wanting their children never to experience the universe outside the hab? Never find a lover? Nanoannie didn't really know any other parents, except for Dr. and Dr. Smythe, and they seemed weirder than her own. Maybe Krona and Escudo were normal, crazy-making as they seemed. Maybe this was the biological pattern for parents. Selfish! No, not always selfish—there was that time—

Still, they wanted her to follow in their boring footsteps and sell her contract to their boring corp.

She felt galactically alone. If only she could discuss this with Kapera. But Kapera was just a little kid.

Well, if she was attacked by sand vampires, Krona and Escudo could drive the rover over and retrieve her desiccated body for cremation. How comforting.

The storm was over, that was for sure. After they landed, there was only a nice breeze, almost palpable if you stretched out your hand. The Sun made Nanoannie braver. When she had tied the plane down, she and Kapera trudged over to the cairn. Now they stood looking down at it.

"We'll need shovels," said Kapera, more serious than Nanoannie had ever heard her, "from the low-pressure greenhouse."

Nanoannie set off at a brisk pace, then realized Kapera was lagging. "Are you sick?" she asked. Kapera shook her head. Maybe Kapera was scared, too. Nanoannie found two shovels on the ground by the entry shed. Dust on them; they hadn't been moved since the invaders had been there. The cold of the bubble steel handles bit through her gloves. She hoisted them over her shoulder.

Kapera broke the silence "Careful. Those are duroceram. Real sharp."

Nanoannie looked around. The

Smythes had always seemed so tidy, yet tools were scattered, even broken, within and outside the shelter. Disorder, clear evidence of burglary. Still, the burglars had to be long gone.

Kapera marched with painful resolve as if propelled by a robotic arm. A few times she stumbled, and squelched cries.

They crested a low slope and surveyed the disturbed ground.

Two mounds of rock and dust. Nanoannie looked around for footprints.

"They must have raked the dust behind them," Kapera said. "We can't tell if they used a rover or a tractor, or walked."

And dragged the bodies here, Nanoannie thought.

You can't feel the air in a suit, out in the environment. But Nanoannie *felt* the atmosphere close in on her.

This was not a good place.

"We should go back. Get help," she told Kapera.

Kapera stood motionless. "No."

"We can go back to my parents." The tiny icon of her parents had been still since they landed. Maybe the satellite relaying it was over the horizon, too far south. No, their service used multiple satellites.

She wondered if her com was out of the skynet, if she and Kapera could speak only to each other. She wondered if Something would rise out of those two mounds of rock. Two Somethings. One for Kapera, one for her.

"My parents will adopt you," she told Kapera. "I'll make them. I'll go on a hunger strike. They'll like you after they get to know you. You and I can be like, you know, sisters. I don't even like my real sister. I'll let you borrow my clothes and I'll do your makeup. And we have money, we can treat your leukemia—"

"No, Nanoannie. I have to find *my* folks."

No footprints here. No wheel tracks. Something had delivered two dead packages here and then flown away. On dry, raspy wings. Belly full of sweet human juices.

"Please," said Nanoannie. "I have a bad feeling about this."

Kapera stood motionless, leaning forward as if to fall like a post. "Give me the shovel."

Nanoannie handed her one of the shovels. Kapera hefted it.

Nanoannie had a sudden idea. "We could get hold of Sekou. He'd help us. He's old enough. Doesn't he have a contract with one of the corps? He could get a homestead."

Kapera turned and gave her a searching look. "Stop talking about Sekou. That's crazy talk." She dragged the shovel behind her to the head of one of the graves. She picked the shovel up and held it like a weapon, blade down, over her head. Then she plunged it into the regolith.

It hardly made a dent.

But she levered out a crumbly chunk of rock and tossed it aside. She drove the blade of the shovel into the ground again. Another small chunk.

"Kapera, in the name of Papa Mars, it'll take you until Winter Solstice to dig the vampires up."

Kapera attacked on the mound again. "Vampires?"

"Or vampire victims." Some said that those sucked dry by sand vampires became vampires themselves, and when night fell, came out to seek lonely humans in the environment.

Stop. That was silly. Wind did not moan over frost-covered dunes. That was some stupid Earther's idea of Mars. Creatures did not persist for millions of mears, since the building of the Face, living only on the fluids of chance visitors from elsewhere in the galaxy, and most recently from Earth. These creatures could not smell moisture through expensive Luna-manufactured environment suits. No living thing—

Kapera raised the shovel to slash at the caked dust underfoot. She was so inept she was probably going to cut her foot off.

"Stop it!" Nanoannie screamed.

"You're making a mess." *And what if you wake the sand vampires up?* she thought.

She heard something.

A raspy gasp.

"Kapera," she whispered into her com. "Kapera, did you hear that?"

"Hear what?"

"A moan. Like somebody being strangled. Struggling to breathe. There's something under the ground!"

"No. No, I didn't hear anything." They both knew if there had been any sound, Kapera would hear it first.

Another raspy breath.

Kapera dashed the shovel into the ground.

"Kapera, at least push the rocks aside before you dig. Didn't your parents teach you anything?"

Kapera dropped the shovel and bent over to pick it up.

Then she tumbled over on her side, and Nanoannie realized that the gasping noise was Kapera.

"Give me the shovel," Nanoannie said. She hauled Kapera up by one arm. Kapera patted the suit arm reflectively and watched as Nanoannie picked up the shovel. Nanoannie added, "Never let any part of your body except the soles of your feet touch the ground. Your weight compresses the insulation and you could freeze your butt."

"I know," said Kapera. Then, "I have to find my folks."

"Look. Do you think if we contacted Sekou, maybe he might help us?"

Kapera said, "Sekou? How could he help?" She knelt down, then slowly toppled forward.

"Stand up!"

But Kapera just lay there. Nanoannie peered through her helmet at her face. Kapera's eyes were closed.

"I'm dragging you back to the plane. Right this minute."

"No." But Kapera didn't get up.

Nanoannie got a purchase on Kapera by wrapping her arms around her. She started to drag her toward the ship, hoping Kapera's suit wouldn't tear on the rocks.

Kapera started screaming and kicking. Suddenly she wasn't so weak.

"Look, Kapera, you're sick. We can't do this. Let's go back to my family's hab. It's close, at least." She thought of the flashing, frantic icon of Krona and Escudo in the corner of her com vision. Surely they would take Kapera in. They would be annoyed, but what could they do?

Kapera was gasping. "We can't just leave them here! I have to know!"

Nanoannie handed her the shovel. "Can you lean on this? I'll dig, just deep enough to know what's under here."

"Yeah. Oh yes. Thank you." She inserted the blade of the shovel into the ground and leaned against it.

Nanoannie tossed rocks from one of the cairns. She hurled them onto a smooth patch of ground. She got into a rhythm. Like destroying something, something evil.

When she had cleared the rocks, she came to layer of soft, caked fines. It reminded her of the fancy powder she bought from a webalog to wear to clubs, for when she got a chance to date Sekou and her other boyfriends. Well, the hell with the other boyfriends. Just Sekou.

Unless of course she found *his* desiccated body under this pile of rocks and fines.

The shovel was indeed sharp, and before she knew it, it hit something frozen and draggy, like a piece of cloth.

A piece of cloth.

Kapera, sensing a change in the rhythm of digging, shambled over and looked down.

A patch of bright blue cloth, Sears Environment Suit blue, shone through the dirt.

Kapera sobbed softly.

"Wait," said Nanoannie. She poked delicately with the shovel. Somewhere would be a helmet—she dug toward the south end of the mound and found a boot. A Sears Environment Suit boot. In great shape, probably still usable, except for the fact that it was occupied.

She stopped, realizing she was getting winded. "You don't have any explanation for this mound of rocks and stuff?"

Kapera shook her head, a movement barely perceptible in the helmet. She said, "I took my mother's newer suit with me, because I outgrew mine. So that has to be my father." She began to weep softly, and Nanoannie saw tears and snot run down her face.

"Wait," said Nanoannie grimly. She pitched into the other end of the mound.

Kapera sank to the ground, and Nanoannie, too agitated to make her get up, continued to dig.

Her shovel struck the hard, transparent helmet. She brushed away dust. The face in the helmet was Asian.

This was not either Marcus or Zora Smythe.

"Kapera, it's okay. It's not your parents or your brother."

Kapera struggled to her feet and came over to look down into the grave. A few more shovelsful and Nanoannie uncovered the other helmeted head. Another Asian face, this one a woman, complete with delicate makeup. Perfectly uninjured, if you discounted the fact that they were both dead.

She looked to see if the eyeballs were popped, like the teachers in the elementary safety class described. Hard to tell. Their eyes were closed. Frost had crystallized over their faces, and if there was blood, it wasn't visible.

"We have to get out of here," said Nanoannie. "We'll have to go to my parents' pharm." She flicked on the frantic icon of her parents. Suddenly alive, a voice message came on, her mother waving crazily.

"Nanoannie! You have to come home!"

Nanoannie sighed and directed her com to answer the message. Within seconds, her mother's real-time face appeared in her virtual vision, saying, "Nanoannie! Thank heaven! You're going to miss Zloty's birthsol. We wondered where you *went*."

"What?" said Nanoannie, feeling tired.

"Well, first of all Elvis Darcy's been here twice, asking about you."

She twisted her face and tried to remember other visits from her parents' corp representative. He seemed boring. Was he married, or wasn't he? He certainly wasn't as interesting as Sekou. She'd have to let him know politely she wasn't interested. "Just tell him—"

Krona took a deep breath. "He said, to stay away from that little Smythe girl, and for Mars' sake don't go near her parents!"

"What?" This was a weird way to put moves on a girl, she thought.

Escudo broke in. "If you're at Smythe Pharm, you're in great danger. Get out of there fast!"

"Danger? Well, I guess. Uh—it isn't really sand vampires, is it?"

"For Mars' sake no! That Japanese couple that were going to buy Smythe Pharm came up missing just after they transferred the purchase price, and just before the deed was transferred. Kapera's parents are wanted for questioning."

Nanoannie squelched the image. She felt wild, like the sky was closing in on her. She couldn't go back home. Home was a trap, a prison. What would her parents and Elvis Darcy do with Kapera?

Kapera's parents obviously hadn't killed anybody. Kapera was too nice to have parents like that.

But somebody had killed the Naguchis. Who?

Were they the same invaders that had trashed Smythe Pharm and gassed her and Kapera? What were they searching for?

And where were Kapera's parents?

She had to find out, for her friend's sake. But how?

Certainly not by going back home and getting undergrounded. ■

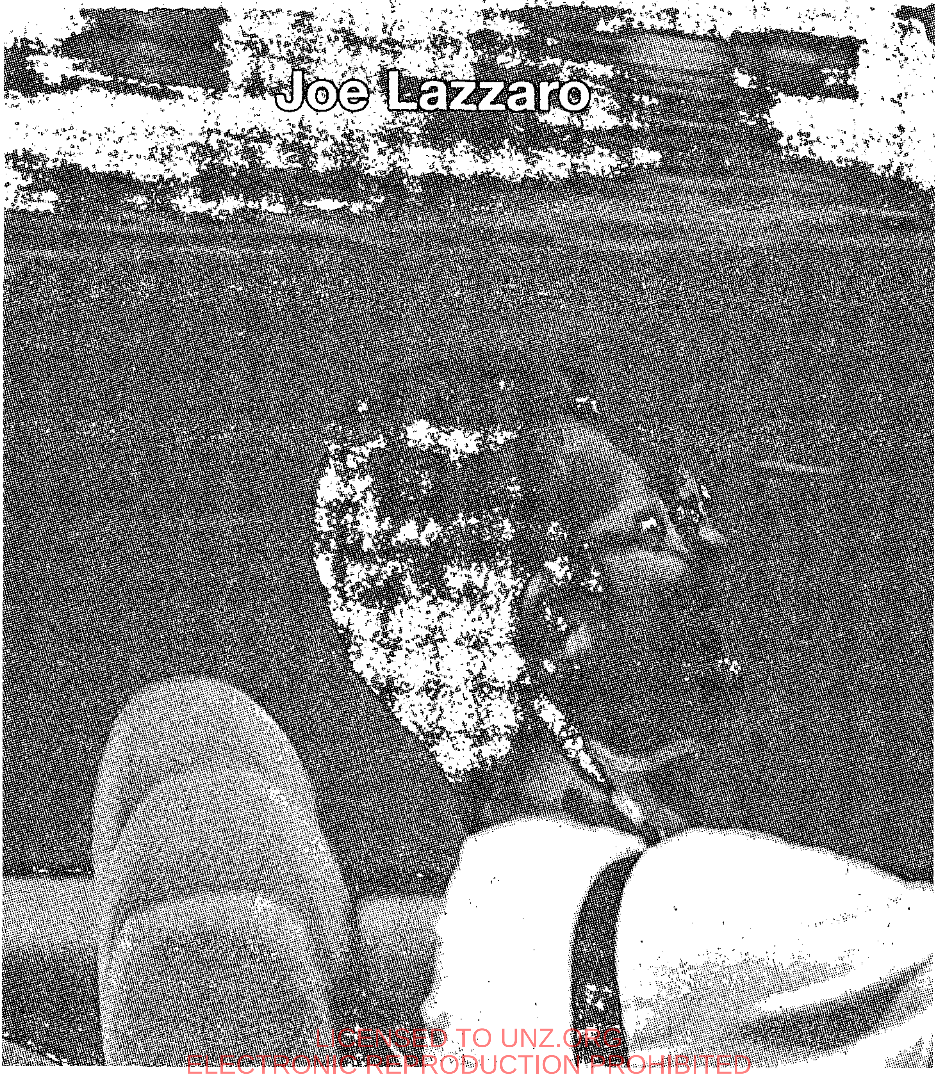
To be continued.

SCIENCE FACT

Artificial Vision and the "Kite and Key" Experiment:

Visual Prosthetics for the Blind

Joe Lazzaro



Photos provided courtesy of the Dobelle Institute

The first commercially implanted Dobelle patient, Jens, uses his artificial vision system to carefully and slowly operate a motor vehicle in a controlled environment. The image shows his upper body and the windshield of the car.

If you read science fiction, or keep up with scientific advancements via the popular press, the concept of artificial limbs, organs, and senses is likely familiar ground. The fields of prosthetics and artificial organs are undergoing fantastic change, and breakthrough bionic solutions are coming online, poised to recast the definition of what it means to have a disability. First-generation artificial-vision systems have proven successful and are about to take their first halting steps outside the laboratory, and preliminary research indicates that 95% of the blind may be able to benefit.

The breakthroughs made over the past several years in visual prosthetics represent one of the greatest triumphs in the history of medicine. I do not say that lightly, or from the sidelines. In this article, I'll explore the recent breakthroughs in artificial vision technology and describe the practical benefits and drawbacks of these first-generation systems and where they may be headed.

My first impressions of these fledgling devices is that they are extremely low-resolution, providing only dot-matrix images, but they most definitely work. Patients who were totally blind with no light perception prior to receiving a visual prosthetic implant can once again see light, movement, and crude shapes consisting of illuminated dots and blobs.

I write this article not as an innocent bystander, but as someone with a firm stake in artificial vision. I have been legally blind for over thirty years and work in the rehabilitation field. As a reaction to my vision loss, I have adopted personal computers and adaptive technology to compensate for my disability. I am writing this article on a Windows XP computer using Microsoft Word and a software program called Jaws that converts my computer into a talking PC. My personal need for adaptive technology eventually led me into the Vocational Rehabilitation field, configuring personal computers with speech, Braille, and magnification systems for persons who are blind or visually impaired like myself.

When I first got wind of artificial vision technology, I had a lot of questions. How do artificial vision systems work, how much vision do they restore, and what are the limitations? How does the vision compare with normal eyesight? Can one read print, watch television, or recognize faces? What is the prospect for the future? Could artificial vision systems interface with computers, effectively piping information directly into the brain? Are the systems portable, and can they be used for independent mobility? Could artificial vision systems evolve to the point where it is equal or superior to ordinary eyesight?

The questions continued to pile up, mingled with cautious excitement. The only way to determine the veracity of the technology was to meet with the scientists and developers. If artificial vision systems proved useful, agencies serving the blind should be aware of them. Since I am responsible for evaluating and deploying adaptive technology for the Massachusetts Commission for the Blind, the task was definitely my responsibility.

How Eyes Work

Before we can discuss how artificial vision systems function, it makes sense to briefly describe how eyes operate. The visual sense is one of our most important windows on the world, allowing us to navigate through our environment. Sight is so critical a sense that it is standard equipment for virtually every organism. Vision is also highly efficient, as it relies on electromagnetic waves moving at the speed of light. The optic nerve is a fat data pipe to the brain, carrying more information per unit of time than the other senses, thus offering a richer, fuller experience than does smell, touch, or taste.

The eye is essentially a receiver of light waves. Photons of light pass through the lens of the eye and are focused on the retina, which resides at the rear of the eye and is analogous to the film in a camera. The retina converts photons of light into electrical signals. These impulses are then passed down the optic nerve, a conduit of over 1.5 million neurons, into the visual cortex of the brain. The signals sent to the brain consist of many parallel channels of information, including depth, movement, etc. This is a vastly over-simplified summary of how the eye, optic nerve, and brain function together, but it will serve our purposes.

What is Legal Blindness?

While our visual system is one of our most powerful tools, it is subject to disease, damage, or the ravages of old age. According to the National Eye Institute, at the National Institute of Health, a person is considered legally blind if the best-corrected vision in the better eye is equal to 20/200 or worse, or the visual field is less than 20 degrees in diameter. Blindness, so defined, impacts about 1.05 million persons in the United States. Internationally, according to the United Nations World Health Organization, it is estimated that in the year 2000 about 45 million persons around the world were totally blind, and about 135 million had a serious visual impairment. Clearly there are a significant number of persons with acute visual impairments who could benefit from artificial vision.

Vision Substitution Systems

Over the past several decades, there have been numerous electronic devices designed to help the blind explore and move more independently through the environment. These devices have traditionally relied on sound and/or tactile feedback to impart information about the environment to the user. One such device, the Mowat Sensor, used high-frequency sound waves to detect objects. Similar to sonar, the Mowat resembled a normal flashlight, and was used to scan ahead for nearby obstacles. The Mowat vibrated when objects were detected, and the frequency of vibration increased as the user grew closer to the object. The Mowat is no longer manufactured, but a similar device, the MiniGuide, is still available. The MiniGuide is available from http://www.senderogroup.com, and also employs high-frequency sound waves that are bounced off objects, producing vibrations or audio feedback for the blind user, and has a range of up to 12 feet.

Another such system, with much more power and flexibility, is Seeing With Sound (http://www.seeingwithsound.com), a freeware software program that runs on Windows-based computer platforms. The software uses a web camera to capture images, then generates sound signals called soundscapes based on the camera input. The software requires a computer equipped with a sound card and speakers or headphones. Seeing With Sound can be used as a mobility device when running on a notebook computer, and can capture and audibly render moving or still images in real time.

Another vision substitution system under development at the University of Wisconsin at Madison, Department of Biomedical Engineering (http://www.engr.wisc.edu/bme/faculty/bachy-rita_paul.html) uses an external camera, computer, and a stimulator module placed on the tongue. The device captures input from the camera and transmits it via wireless fm signals to the tongue display, which is worn like an orthodontic dental appliance. Researcher Paul Bach-y-Rita indicates that the tongue may be the ideal place for an electrode array—it's highly conductive, sensitive, and requires less voltage than fingertip stimulation. The device has been tested by blind subjects as a mobility aid, and has applications for other disabilities. While this is not real vision, it could be an inexpensive and non-invasive alternative sensor to enable persons who are blind to move more securely through the environment. Until visual prosthetics come fully online, or we learn how to fix eyes completely, vision substitution devices will remain the only game in town.

A First Peek At Artificial Vision

In early June 2002, I received a press release from the Dobelle Institute (http://www.artificialvision.com) describing their prototype artificial vision system for the blind, and announcing that they would be demonstrating the technology at the 48th meeting of the American Society for Artificial Internal Organs conference at the New York Hilton on June 13, 2002. According to the press release, a Canadian man blind in both eyes would be demonstrating the system by driving an automobile in a controlled environment. I reread the press release several times before picking up the phone to call the Dobelle Institute.

Doctor William Dobelle—intense, highly intelligent, but very down-to-earth—discussed his system with passion and candor. He reminded me of many of the brilliant and headstrong personalities I've encountered in the sciences, a man committed to goals that would literally change the world if successful. I asked him what inspired him to conduct research into visual prosthetics, and he told me that he was inspired by Benjamin Franklin and his early electrical experiments. He had access to a number of Franklin's papers while at Johns Hopkins, and read these with eager interest.

Before we hung up, he invited me to the press conference during the upcoming week. I had somehow managed to convince him that he needed someone who was familiar with the blindness technology field to witness the demonstration. I accepted and asked for his email address. Dobelle had to consult his office manager Louise for his email address, and to have her send me an email with directions, which I found charming. I dared to joke with the good doctor, "You built a device that lets the blind see, but you don't do email?" There was the slightest pause, then he spoke with ironic humor. "Sir, we all have our limitations."

After getting off the phone with Doctor Dobelle, I phoned my friend Ian Randall Strock, former associate editor with *Analog*, now editor of *Artemis* magazine. I thought it was appropriate and necessary to bring a science fiction editor and fellow fan to a conference where a blind man drove an automobile using a video camera interfaced to his brain.

Introduction to Visual Prosthetics

Before we discuss the Dobelle visual prosthetic, let's look at a brief history of artificial vision. In 1967, Giles Brindley stimulated the visual cortex of a nurse who was totally blind, and she saw bright blobs and flashes of light in her visual field as a result of the stimulation. If this technology could be implanted safely and made portable, the concept would have a lot of promise. Due to the limitations of the technology at the time, however, Brindley's system was totally impractical.

While the concept of electrical stimulation of the surface of the visual cortex obviously works, there are those in the artificial vision community who disagree with this approach, calling it bit-mapping. They claim that sight is multichannel, not just spots of light. More on that later.

In the early 1990s, the National Institute of Health conducted trials on electrical stimulation of the visual cortex, building on the work of Brindley, confirming that blinded patients saw flashes of light when their visual cortex was electrically stimulated. In 1996, Illinois Institute of Technology (IIT) scientist Philip Troyk (http://www.iit.edu/publications/iit_magazine/2002/04/troyk_1.html) began an ambitious research project to develop an implantable visual prosthetic device that would build on earlier work in the field. The goal was to create an implantable array consisting of electrodes that would penetrate the visual cortex and reside just under the skull. The implant was designed to receive input from an external camera through the skull using a wireless system. It looks a lot like the typical visual cortex implant, similar to the Dobelle system, but it takes a different turn in two ways. The IIT system is wireless, unlike the Dobelle Institute's system, which uses cables to connect the two pedestals at the back of the skull to a portable computer. The proposed IIT prosthetic also differs in that it relies on the principle that vision is not just dots of light or pixels, but rather a complex series of parallel channels of data including edges, textures, colors, depths, and motion, all fed to the brain for integration and processing via the optic nerve. The researchers claim that brain bitmapping can never provide images with real depth and detail, even if we are able to implant dense clusters of electrodes on the surface of the visual cortex. The IIT team claims that in order to provide richer, more normal vision to the patient, many channels of data including depth, motion, etc, must be sent deep into the cortex using penetrating electrodes, a much more invasive and potentially dangerous procedure than mere surface stimulation with non-penetrating electrodes.

Another approach to artificial vision involves implanting a device onto the retina, rather than the visual cortex. Retina chips have received a lot of space in the popular press, mainly because the technology is undergoing FDA-approved clinical trials in the United States. There are also international efforts underway to develop practical retina chips. Researchers have been working on visual prosthetic devices that tap into the visual system at the retina level for several years now, and these systems could be of tremendous value to those with degenerative eye diseases of the retina such as retinitis pigmentosa (RP) and macular degeneration (MD). Diseases such as RP and MD degrade the retina and gradually destroy a person's eyesight entirely. Retina chips augment and boost the function of the retina, sending enhanced electrical signals down the optic nerve to the visual cortex, a virtual pacemaker for the human eye. Doctor Mark Humayun of the University of Southern California (http://www.usc.edu/hsc/doheny/news/ophthalmologists.htm), has just conducted the first clinical trials of a retina chip that has successfully restored limited vision to three test subjects. The chip consists of a four-by-four pixel array, residing on top of a degraded retina. The chip receives images from a wireless external camera, and electrically stimulates the retina, producing closely spaced dots of light. This system relies on having at least a partially working retina, and triggers the electrochemical reaction that would happen when a photon of light hits the retina. There are plans to increase the resolution of the chip, and the next step appears to be a chip with 100 pixels. Optobionics (http://www.optobionics.com) is also working on a retina chip that has met with initial success, and is continuing to develop the technology. There are also retina chip programs underway in Europe, Australia, and Japan. For those with certain diseases of the retina, this first generation of retina chips appear to be meeting with initial success. For patients with more severe retinal impairments, or those whose blindness is rooted in problems with the optic nerve, the most appropriate approach appears to be direct electrical stimulation of the visual cortex, bypassing the retina and optic nerve altogether.

The Dobelle Institute is the clear frontrunner in the artificial vision business. Dr. William Dobelle began work on an experimental artificial vision system in 1968 at Columbia University. Dobelle electrically stimulated the visual cortex of several patients undergoing brain

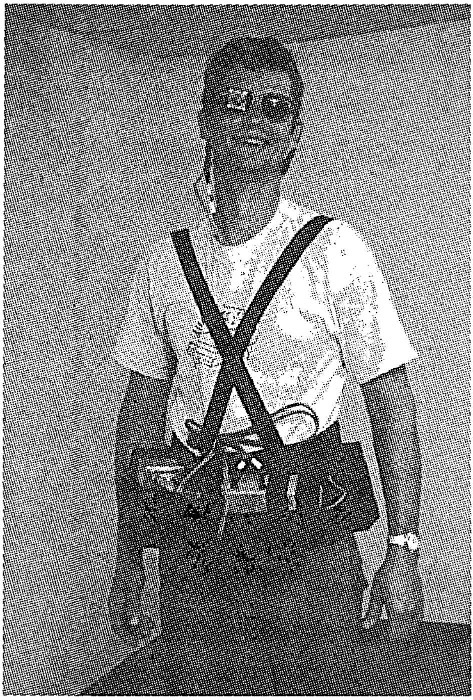
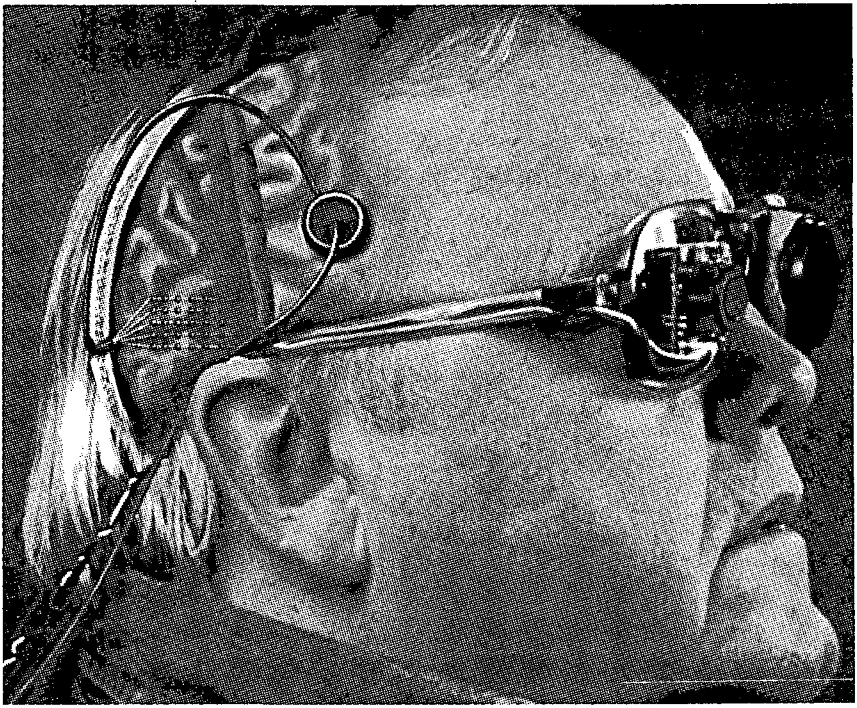


Photo 2. (left page).
This photo shows Jens wearing the current electronics package. The miniature television camera can be seen mounted on the glasses, and three separate components of the electronics are mounted on his belt. They are the battery, computer, and stimulator.

Photo 3. (right page)
This photo shows a cutaway showing the electrodes on the brain and the miniature television camera on the glasses. The portion of the illustration showing the brain is superimposed on Jerry's (Dobelle's first subject) profile. The electronics package on the belt is omitted.

surgery to remove tumors or lesions to the brain. These test subjects all reported that they saw bright flashes of light called phosphenes when electrically stimulated. No surprise there; that had been proven by earlier experiments. The next step for Dobelle was to determine if a permanent set of electrodes could be implanted onto the visual cortex without damage, infection, or risk of seizure. Dobelle seems to shrug off claims that his vision system is crude. Dobelle is bending metal and deploying systems, even though there are those in the scientific community who disagree with his approach. Dobelle is a maverick, but has met with initial success. It does work, and you have to start somewhere. At the time of this writing, Dobelle has so far implanted thirteen patients. I've spoken with several of them over the past two years, and they all have more vision now than when they first met William Dobelle. Is his approach the last word in artificial vision? I don't think anyone can answer that now. But at least he has taken the risk to explore one of the forks in the road, and the patients I've talked with all say they would do it all over again.

The Dobelle artificial vision system consists of a video camera mounted on a pair of sunglasses, two belt-mounted computers to control the system, a battery pack giving four hours of use, and two electrode arrays, consisting of 242 individual electrodes each. The camera is connected to a computer, which is in turn connected to a secondary computer called the stimulator. The first computer handles the image-processing algorithms, and then communicates with the stimulator, which in turn communicates with the two electrode arrays implanted on the surface of the visual cortex. The stimulator's job is to decide which electrodes to fire to generate the dot-matrix image. The stimulator is wired into twin carbon pedestals at the base of the skull. These carbon



pedestals have 242 Teflon coated wires each. Each pedestal is thus connected to one of the electrode arrays.

Implanting both electrode arrays in both hemispheres of the visual cortex involves a surgical procedure under general anesthesia. Dobelle says that the electrode arrays could be implanted by any competent neurosurgeon as outpatient surgery. Currently, the procedure is performed only in Portugal, as Dobelle's vision system is not yet approved by the FDA in the United States.

The procedure involves temporarily removing about a 2-by-3-inch rectangle from the back of the skull. The two electrode arrays, Mylar triangles each containing 242 individual electrodes, are then placed on the visual cortex, one on the right, and another on the left. The arrays are placed under the dura, the protective covering of the brain. The arrays do not penetrate the tissue of the cortex, to prevent bleeding. Each one of the 242 electrodes per array is capable of producing from one to four closely spaced phosphenes. Once the electrodes are inserted, two pedestals are screwed to the skull. The skull is then closed and the scalp put back in place, and the patient begins to heal.

The system is briefly tested while the patient is still in hospital, but this is just a shakedown cruise. During the initial testing, the electrode arrays are stimulated, and the patient is asked to report what he or she sees. Most patients at this time report seeing crude circles, blobs, comets, and flashes of light with no discernable pattern. At this point, the presence of phosphenes is more important than their placement in the visual field. Fine-tuning the system will come later, when the map of the patient's visual space is built.

Mapping the Visual Space

Mapping relies on a principle called retinotopy, long known to artificial vision researchers. Stated simply, as long as the same place on the visual cortex is stimulated, the flashes of light (phosphenes) always appear in the same place in the visual field. This principle allows dot-matrix images to be created by selectively firing one or more of the 242 individual electrodes on each array.

Mapping is accomplished by plugging a notebook computer into the pedestals at the back of the skull. The notebook's software selectively stimulates individual electrodes and groups of electrodes, and the patient is asked what he sees in his visual space after each stimulation event. The stimulation parameters are different for every patient, due to the slight differences in brain structure from one individual to another, and the exact placement of the electrode arrays. The patient is instructed not to move his eyes to look directly at the phosphene patterns that are generated during mapping, as eye movement will skew the results, making it necessary to repeat the stimulation sequence. But once mapping is complete, the patient can then begin to utilize the system.

Seeing is Believing

How much vision is restored using a visual prosthetic? While this can be quantified, the subjective interpretations of individual subjects can vary greatly. I have met several of the patients from the Dobelle Institute's artificial vision effort. These individuals all have had working systems implanted, and are using them for way-finding, object detection, and just for pleasure. The system is portable, and can be carried in a backpack or gym bag.

Jens is the most publicized of Dobelle's patients, and we met in New York in the summer of 2002, where he demonstrated the system's components. Since then, we have been in periodic communication by phone and electronic mail, and the story he tells is highly compelling. Jens is quick to admit that his newly regained vision is crude, and much less detailed than normal vision. But he states emphatically that artificial sight is much preferable to the world of darkness in which he lived prior to obtaining the implant. During a CNN story that ran in June of 2002, Jens described how turning the system on was like throwing back the curtains, letting in the light again. He sees the world in a different way now, in dots and blobs of light that create rough shapes and patterns.

Jens described artificial vision with a simple analogy. Start with a coloring-book line drawing of a person. Fill in the hollow drawing with dots and blobs of light, and then remove the inked lines. You will then be left with a crude, dot matrix image of a person. Jens admits that the artificial phosphenes do not create highly defined shapes, but it is possible to identify objects and their spatial orientation. Jens indicates that he doesn't always know exactly what he's seeing, but he is immediately aware of objects in his immediate vicinity. Jens can see the flickering of a fire, the lights of his Christmas tree, objects put before him on a table, passing cars on the road, the rough outline of trees and foliage, and his children. One very encouraging point: he claims that the longer he uses the system, the more he is able to recognize what he's seeing. He no longer sits in the back seat of the car, but up front, where he has a wider field of view.

Looking into the Future

Crude, first-generation artificial vision systems have taken their first halting steps out of the laboratory, and into the real world, but there is a lot of work still remaining. The Dobelle Institute is the de facto leader in this field, with their cortical artificial vision system. According to Dobelle, the system should be useable by about 95% of the blind population, provided they lost their vision late in childhood. He claims that the system will even help individuals who have been blind for an extended period. Dobelle has proved this by successfully implanting the system in individuals who have been blind for as long as sixty years. Obviously, this also goes for other artificial vision systems from other research efforts. For those born blind, artificial vision systems do not appear practical at this time, due to the lack of development of the visual cortex. But perhaps the visual cortex of such patients could be stimulated and remapped? We simply don't know yet. But this would be an excellent topic for research.

What are the drawbacks? The current Dobelle system, or any other for that matter, does not yet allow patients to read print, recognize faces, or see precise shapes. But the future of artificial vision is hopeful because of the continuing advancement in computers, microengineering, materials, and machine/brain interfaces.

Dobelle is working on refining and focusing the images created by his device, rather than increasing the number of phosphenes. He believes that this will create a more practical prosthetic with the current electrode arrays and electronics. On the other hand, Dick Normann, another artificial vision researcher at the University of Utah, has indicated that systems with higher resolution may be realized if penetrating electrode arrays are used instead of surface stimulators, such as those that are used in the Dobelle system. Normann claims that penetrating arrays require less electricity and will allow individual neurons to be stimulated, and could result in smaller and more closely focused phosphenes, creating an image with higher resolution. There is also the ongoing and successful work of Dr. Mark Humayun with his 16-pixel retinal stimulator that has restored limited vision to three test subjects. Humayun plans to upgrade the system to a grid of one hundred pixels. Moreover, the research underway at the Illinois Institute of Technology under Dr. Philip Troyk appears sound, and his plans for a multiple-channel cortical visual prosthetic may bear fruit in the near future. The implications of artificial vision are staggering, and many persons who are currently blind will likely have some of their sight restored using visual prosthetics of one form or another in the not too distant future.

Speaking historically, we may trace some of the roots of artificial vision to the experiments of Benjamin Franklin. In his ASAIO Journal article, Dr. Dobelle makes a direct reference to Franklin's 1751 "Kite and Key" electrical experiments. Like Franklin, Dobelle is a crotchety visionary, and has pushed the envelope with his ground-breaking work, turning theory into first-generation prosthetics. At the current rate of development, it is almost a given that visual prosthetics will start to become routine within five to ten years. At the time of this writing, artificial vision systems have been successfully implanted in over two dozen individuals. This growing list of brave volunteers and farsighted researchers richly deserve our praise and admiration for they have begun a task of literally biblical proportions—giving sight back to the blind. ■

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About The Author

Joe Lazzaro is a fact and fiction writer, and has appeared twice in *Analog* with short stories; he is coauthor of "Ben Franklin's Spaceship." His latest book, *Adaptive Technologies for Learning and Work Environments*, Second Edition, was reviewed in the July/August 2003 issue of *Analog* by Tom Easton in the Reference Library column. Joe has written for *Byte*, *Time Life*, *the New York Times*, *MIT Technology Review*, *IEEE Spectrum*, *Artemis*, *Absolute Magnitude*, and other magazines about computer-based assistive technologies for persons with disabilities. He is project director for the Adaptive Technology program at the Massachusetts commission for the blind in Boston, http://mass.gov/mcb. Joe is also an instructor with http://easi.cc (Equal Access to Software and Information), an online institute offering distance-learning classes on adaptive technology for persons with disabilities. Joe has appeared on Art Bell's Coast to Coast, NPR, and CNN. He maintains a web site at http://www.joelazzaro.com, and can be reached by email at Lazzaro@TheWorld.com.

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Menace in Morea

Menace in Morea

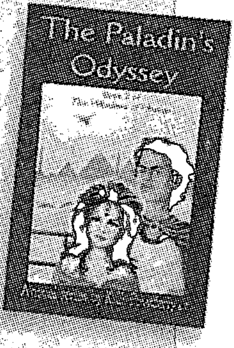
by Ally J. Mahin

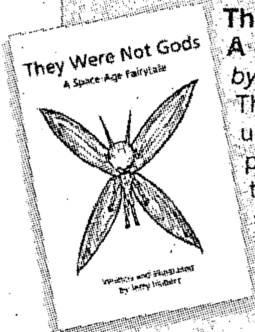
Abnorm-in-hiding Shay McEire finds love with the feared Paladin general who executes her kind while the prince who would protect her in his secret crusade for abnorm rights walks an agonizing path alone. To love Shay, the general must slay internal demons and external foes while Shay must defy even death to love him.

The Paladin's Odyssey

by K. G. Powderly Jr.

Prehistoric echoes in myth, legend and sacred scriptures reveal an annihilated world whose remains we occasionally find as out-of-place artifacts in the fossil record. *The Paladin's Odyssey*, second book of *The Windows of Heaven*, continues Seer-Prince A'Nu-Ahki's struggles through the decline of his complex and terrifying world in this epic retelling of an ancient deluge apocalypse for the 21st century.





They Were Not Gods
A Space-Age Fairytale

by Jerry Hubert

This is a story about space travel and the universal definition of humanity. Follow the paths of Paleface, Cros, and Thundercloud—three beings not so different from us—in this science fiction novel drawing from the spirit of the Gospels, *Frankenstein*, and the "ancient astronauts" theories of Erich von Däniken.

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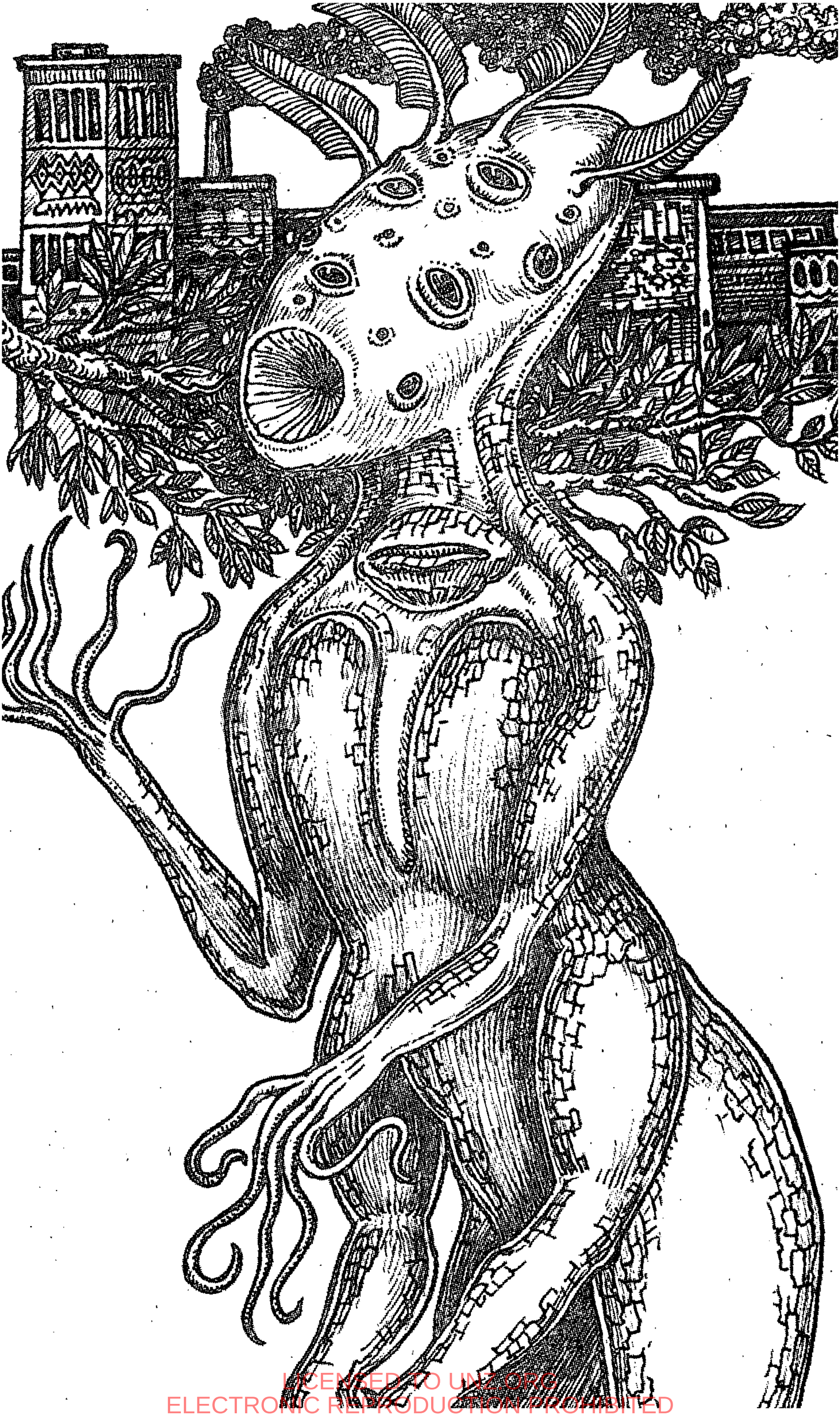
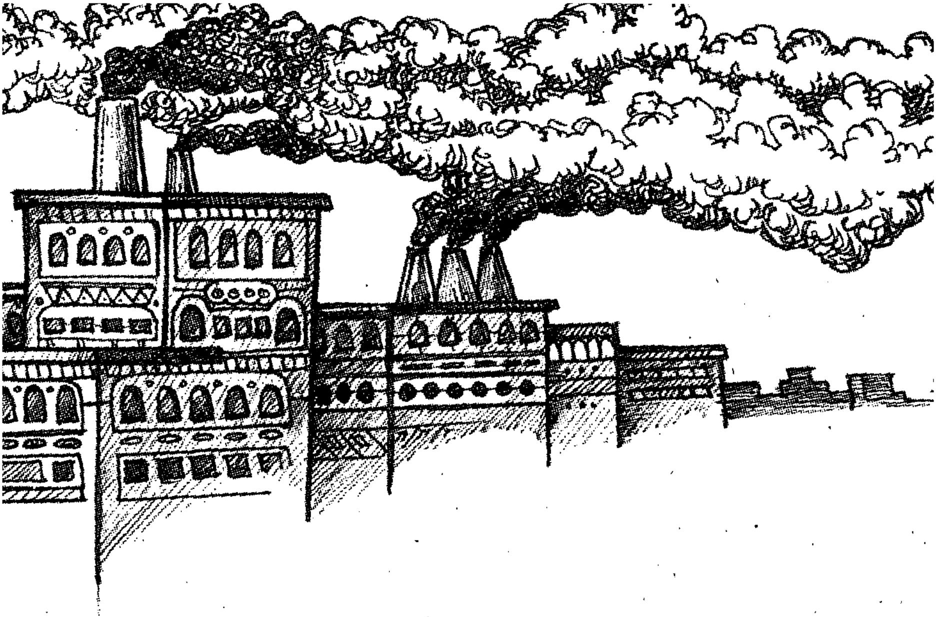




The Clapping Hands of God

Michael F. Flynn

Illustration by Wolf Read

How much explorers learn about a world—and what they can do about what they find—depends on how they come to it.

To a world unnamed by humans, humans came. The gate swung open on a pleasant mountain glade, where the weather could be cool without being cold, and which lay cupped in a high valley below the tree line and far from the gray smudges of the cities on the plains below. This isolation was by happy chance and not by wise choice. Gates swung where God willed, and man could but submit. Once, one had opened in the midst of a grim fortress full of armed and hostile *things* and what befell the team that crossed no man knows, for the gatekeeper sealed it forever.

Here, the humans erected a fine pavilion of gay cloth among mighty growths that might be called trees and colorful splays that might be called flowers, although they were neither trees nor flowers exactly. The motley of the fabric clashed with the surrounding vegetation. The colors were off. They aped the complexion of a different world and seemed here a little out of place. But that was acceptable. The humans were themselves a little out of place and a bit of the familiar ought to surround them in the midst of all the strangeness.

They decked the pavilion with bright cushions and divans and roped the sides up so the gentle and persistent eastern breeze could pass through. They stoked their larder with melons and dates and other toothsome delights and laid their carpets out for prayer. Though no one knew which direction served—the stars, when the night sky came, provided no clue—the gate itself would do for *mihrab*.

The humans spent a night and a day acclimating themselves to the strange sun and testing the air and the water and the eccentric plants and such of the motiles as they could snare. They named these creatures after those they knew—rabbit, goat, swallow, cedar—and some of the names were fair. They stretched their twenty-four hours like taffy to fill up a slightly longer day. By the second nightfall they had shed their environmental suits and felt the wind and the sun on their skin and in their hair. It was good to breathe the world's largesse, and many an outlandish aroma teased them.

Exploring their valley, they found a great falls and spent another night and day at its foot, spellbound. A stream poured into the valley from high above, where the snows always fell and the snows always melted. It tumbled from the sky with a roar like the voice of God, throwing up a mist from which they named the mountain and within which a kaleidoscope of rainbows played. Its ageless assault had worn a pool unknowably deep in the rock below. Where and how the waters drained from the pool God withheld. There was not another like it in all the Known Worlds.

Afterwards, they clustered in their pavilion and reviewed their plans and inspected their equipment, and assembled those items that required assembly. Then they told off one of their number to ward the gate they had passed through and settled themselves to study the strange folk on the wide plains below.

Hassan Maklouf was their leader, a man who had walked on seventeen worlds and bore in consequence seventeen wounds. To ten of those worlds, he had followed another; to seven, others had followed him. From four, he had escaped with his life. With two, he had fallen in love. He came to the lip of the little bowl valley and from a gendarme of rock studied the plains through a pair of enhanced binoculars. Which are you, he asked the planet spread below him, assassin or lover? The answer, like the waters of the pool, remained hidden.

"This is a fine place," Bashir al-Jamal declared beside him, as broadly approving as if he himself had fashioned the glade. Bashir was Hassan's cousin and this was his first outing. A young man, freshly graduated from the House of Gates, he bubbled with innocence and enthusiasm. Hassan had promised their grandfather that Bashir would come back. *With a scar,* the old man had said severely. *The trek is not worth the going if one bears no scars back.* But then, grandfather was *Bedu* and such folk had hard ways.

"The water is pure; the air clean," Bashir continued. "Never have I camped in a more beautiful place."

Hassan continued to scan the lowlands. "I have seen men killed by beautiful things."

"But the biochemistry here must be so different, none of the beasts would find us tasty."

Hassan lowered his binoculars and looked at his cousin. "Before or after they have taken a bite?"

"Ah," Bashir bowed to the older man's advice. "You are the fountain of wisdom."

"I live still," Hassan told him raising the binoculars again. "Call that wisdom, if you wish."

"At least, we may study this world unseen," Bashir said. Deprived of one good fortune, he would seize another. "There is no evidence that the locals have ever been up here."

"Perhaps it is one of their holy places," Hassan suggested, "and we have violated it. God has granted to each folk one place that is holy above all others."

Bashir was not impressed. "If He has, this well may be it; but I think it is too remote."

Hassan grunted and lowered the binoculars. "I want a guard posted here and a sensor array, so that nothing may approach from this direction."

"Up a sheer cliff-face?"

"Perhaps the worldlings have climbing pads on their hands and feet. Perhaps they have wings. Perhaps they have nothing more than cleverness and perseverance." He capped his binoculars and returned them to their case. "I would fear that last more than all the others."

This is how they came to be there, in that enchanted glade upon the Misty Mountain.

Behind this world lies a shadow world. It is called the Other 'Brane, and it lies not so very far away, save that it is in *the wrong direction*. It is behind us, beneath us, within us. It is as close as two hands clapping, and as far. Once before, they clapped, this 'brane and the other, and from the echoes and the ripples of that Big Clap, came matter and energy and galaxies and stars and planets and flowers and laughing children. Should they clap again, that will end it all, and many wise men fret their lives on the question of whether the two be approaching or no. But to know this they must learn to measure *the wrong direction* and that is a hard thing to do.

Hassan thinks of the two 'branes as the Hands of God, for this would make literal one of the hidden Recitations of the Prophet, peace be upon him. But he sees no reason to worry over whether they are to clap or not, since all will be as God wills. What, after all, could be done? To where would one run? "The mountains are as fleeting as the clouds." So reads the fiqh of the 'Ashari 'aqida, and the other schools have assented with greater or lesser joy.

What *can* be done is to travel through the Other 'Brane. That skill, men have learned. The Other 'Brane is spanned like ours by three space-like dimensions and one time-like dimension; but it contains no planets, no vast spaces—only an endless, undulating plain, cut through by featureless chasms and buttes. Or maybe it is nothing of the sort, and the landscape is only an illusion that the mind has imposed on a vista incomprehensible to human senses.

Crossing the Other 'Brane is a hard road, for the journey from gate beacon to gate beacon must be swift and without hesitation. There is an asymmetry, a breaking of parity, hidden somewhere in the depths of that time which was before Time itself. To linger is to perish. Some materials, some energy fields, last longer, but in the end they are alien things in an alien land, and the land will have them. What man would endure such peril, were not the prize the whole great universe itself? For the metric of space lies smaller on the Other 'Brane, and a few strides there leap light-years here at home.

How many light years, no man knew. Hassan explained that to Bashir on the second night when, studying the alien sky, his cousin asked which star was the Earth's, for no answer was likely. Was this planet even in a galaxy known from Earth? How many light years had their lumbering *other*-buses oversprung, and in which direction? And even if Earth's sun lay in this planet's sky, it would not be the sun they knew. Light speed does not bind the universe; but it binds man's knowing of it, for in a peculiar way *place* is *time*, and all man's wisdom and knowing is but a circle of candle light in an everspreading dark. No one may see farther or faster than the light by which one sees. Hence, one perceives only a timebound sphere within a quasar halo. Now they had stepped into the sphere of another campfire, somewhere else in the endless desert of night.

"The stars we see from Earth," Hassan explained, "are the stars as they were when their light departed, and the deeper into the sky we peer, the deeper into the past we see. Here, we see the stars from a different place, and therefore at a different time."

"I don't understand," Bashir said. He had been taught the facts, and he had learned them well enough for the examinations, but he did not yet *know* them.

"Imagine a star that is one million light-years from the Earth," Hassan said, "and imagine that this world we are on lies half-way between the two. On Earth, they see the star as it was a million years ago. Here, we see it as it was a mere five hundred thousand years ago, as we might see a grown man after having once glimpsed the child. In the mean time, the star will have moved. Perhaps it will have changed color or luminosity. So we do not see the same star, nor do we see it in the same place. Ah, cousin, each time we emerge from our gate heads, we find not only a different world, but a different universe."

Bashir shivered, although that may have been only the evening breeze. "It's as if we are cut off and alone. I don't like it."

Hassan smiled to himself. "No one asked that you do." He turned toward the pavilion, where the others buzzed with discussion, but Bashir lingered a moment longer with face upturned to the sky. "I feel so alone," he said softly, but not so softly that Hassan failed to hear.

They studied the world in every way they could: the physics, the chemistry and biology, the society and technology. The presence of sentients—and sentients of considerable attainment—complicated the matter, for they must understand the folk first as they were and not as they would become; and that meant to see without being seen, for the act of knowing changes forever both knower and known. But to study even a small world was no small thing. A single flower is unfathomable.

They sought the metes and bounds of the planet. What was its size? Its density? Where upon its face had the gate swung open? How far did it lie from its star? Soong marked the risings and the settings of sun and moons and stars and groped toward answers.

They sampled the flora and the fauna in their mountain valley, scanned their viscera, and looked into the very architecture of their cells. Mizir discovered molecules that were like DNA, but not quite. They imagined phyla and classes upon the creatures, but did not dare guess at anything more precise.

Ladawan and Yance launched small, stealthy birds, ultralight and sun powered, to watch and listen where men themselves could not. On their bellies these drones displayed a vision of the sky above, captured by microcameras on their backs, in that way achieving an operational sort of invisibility, and allowing the tele-pilots to hover and record unseen.

"No radio," Soong complained and Hassan laughed a little at that, for always Soong preferred the easy way. "We will have to plant bugs," Hassan told the team when they met after the first flight for debriefing, "to study their tongue, for we cannot hear them otherwise."

"They don't have tongues," Mizir said, though with him it was less complaint than fascination. "They make sounds, and they communicate with these sounds, but I don't know how they make them."

"See if you can locate a body," Hassan told the tele-pilots. "Perhaps there are morgues in the city," pointing to the dark, smoky buildings that nestled distant against the bay of a cold, blue ocean. "Mizir needs to know how those people are put together."

"Tissue samples would be nice," Mizir added, but he knew that was lagniappe.

"An elementary school might have simple displays of their written language," Bashir suggested. It was a standard checklist item for the assay of inhabited worlds, studied and carefully memorized in his training, but Hassan was pleased that the boy had remembered it.

"Coal smoke," Klaus Altenbach announced the next day after a drone had lasered the emissions of a building they believed to be a factory. "Or something carbonaceous. Peat? Not petroleum—those bunkers are with something solid filled. Technology is mid-nineteenth century equivalent," he said, adding after a moment, "by the Common Era. I expect soon the steamships to come to those docks." When Ladawan asked him from where these ships would come, he shrugged and told her, "There cannot be a horizon to no good purpose."

"It is a strange-looking city," Mizir said, "although I cannot say why."

Yance Darby scratched his head. "Don't look all that strange to me. 'Cept for the folk in it."

"They really are graceful," Iman said of the indigenes, "once you grow accustomed to their strangeness. They are curlicues, filigrees of being. They must have art of some sort. Their buildings are intaglio—plain boxes, towers, but they have incised their every surface. Look for painting, look for sculpture." And she set about to build a mannequin of the folk.

"There's so much to learn!" cried Bashir, overwhelmed by it all. Being young, he was easily overwhelmed; but a world is not something to be nibbled at. If one is to taste it at all, it must be swallowed whole; and yet that is impossible.

"As well sip the Nile," Mizir grumbled. "We could spend the rest of our lives here and not learn the first thing."

"Oh, we'd learn the first thing," said Hassan. What worried him, and kept him awake into the night, was not the first thing they might learn, but the last.

And so it went. The drones flew. Digital photographs downloaded into a mosaic map of landforms and soil types and vegetation. (Soong longed for a satellite in low orbit.) They sprinkled small ears about the city one night and harvested from them a Babel of sounds for the Intelligence to sort into phonemes and other patterns. (The Intelligence concluded that two languages were in use, and set itself to ponder the matter.) Mizir had for the time to content himself with creatures he could collect nearby. ("Alpine species," he grumbled. "How representative are they of the coastal plains, the estuaries?") Klaus discovered a railroad coming into the city on the far side. ("They had somehow to bring that coal in," he joked, "and muleback I thought unlikely.") The engines were steam-powered, with spherical boilers.

Bashir wanted to name the world.

Long-timers like Hassan and Soong and Mizir seldom bothered with such things.

In time, the planet would speak and its name would be revealed. Until then, Hassan would simply call it *the world*. Still, when the team debriefed on the seventh day and Bashir broached the issue, Hassan did not stop the others from discussing it.

They lounged on the cushions and ate dates and cheeses. Yance Darby, like Bashir recently graduated from the House of Gates, tossed pieces of food at the curious animals, causing them to scamper away, until Iman scolded him for it. That the crumbs were indigestible would not stop animals from swallowing, and who knew what would come of that? Soong sat a little apart, on high furniture at a table spread with printout maps, while he and Klaus and Ladawan traced geography and the road network on maps made of light. A phantom sphere floated in the air above the projector: all black, all unknown, save the little spot where they encamped—and they were not yet certain they had placed it properly.

Hassan stood apart, outside the pavilion, under stars strange and distant. He held a cup of nectar in his hands and studied the MRI holograms of the local fauna that had been arranged on a display board, and he traced with a fingertip the clade lines that Mizir had guessed at. *How strange*, he thought, *and yet how familiar, too*. God was a potter and Nature was His knife. Everywhere life took form, He shaped it toward the same ends. And so there were things like mice, and things like hawks, although they were quite different in their details. The mouse had six legs, for one thing—its gait absorbing thereby many hours of Mizir's close attention—and the hawk had claws on wingtip and feet and concealed, too, beneath its covert.

Iman had constructed a mannequin of the sapients and had placed it by the entrance to the pavilion. Man or woman, no one knew, or even if such categories had meaning here. It stood shorter than a human and, at rest, assumed a curious sinusoid posture, like a cobra risen. In form, bilaterally symmetric, but possessed of four arms and two legs. Large lifting arms grew from mid-torso; smaller manipulators farther up. Claws tipped the one set, tentacles the other. The feet ended in claws, too, though these were stubbier. Mizir thought that the ancestral form had been six-legged, too, like so many of the scuttling things in the meadow, and the clawed lifting arms had evolved from the midlegs. "They are rodents," he had said, arranging their image under that clade, "or what things like rodents might become."

"Yet the 'rodents' here are territorial," Iman then told him, "which is very unrodentlike."

"Everything is the same the universe over," Mizir had answered philosophically, "except that everything is different, too."

Atop the torso sat a structure shaped like an American "football" positioned for a kick-off. The skin was smooth, without hair or feathers, but with small plates, as if the creature had been tiled by a master mason. The creature's coloring was a high cerulean, like the clear sky over the desert, though with darker patches on its back. But Mizir had spotted others in the throngs of the city—taller, slimmer, tending toward cobalt—which he thought might hail from the world's tropics.

It was a rich world. Diverse. There were many races, many tongues. There were alpine meadows and high prairies and coastal estuaries. How many eons deep was it? What lay over the curve of the horizon? How could they hope to grasp more than a meager slice? They would never know its history. They could hardly know its culture. Was that city below them—blackened with soot, lively with activity—the pinnacle of this world's civilization? Or was it a cultural and technological backwater? Later, they would send the drones out on longer recon flights, but even that would only scratch at the surface. *Men will come* *here for years*, Hassan thought, *perhaps for generations. And maybe then we will know a little*.

The creature in the model had no face. There were filaments that Mizir thought scent receptors; there were gelatin pools that were likely eyes. There was a cavity into which they had watched indigenes spoon food. But none of these features were arranged into a face. Indeed, its mouth was in its torso. The filaments waved above the football like ferns. The gelatin-filled pits were distributed asymmetrically around the headball, as were other pits, apparently empty, and a large parabolic cavity perversely set where a human mouth would be, although it was not a mouth at all.

"They really are beautiful," Iman said. She had come to stand by Hassan while the others chattered on about possible names for the planet. Hassan nodded, though in acknowledgement rather than agreement. He thought the indigenes looked scarred, pockmarked, twisted out of true. But that was because his mind sought a greater symmetry of features than was offered.

"Beautiful, perhaps; though they differ somewhat from the life forms Mizir has found up here," he said. "I think they are interlopers. I think they have come from somewhere else, these people of yours. Perhaps from across that ocean."

"Perhaps," she allowed the possibility. "Soong says that the entire coastal plain came from somewhere else, and its collision with this continent raised the Misty Mountains."

"I keep seeing a face," he said to her. "I know there isn't one, but my brain insists on nostrils and ears. It seems to be smiling at me."

"Recognition template," Iman said. "People have seen 'Isa, praise be upon him, in a potato; or Shaitan in a billow of smoke."

"It bothers me. We need to see these people the way they are, not the way we think they are."

"It was easier on Concannon's World," she told him. "The indigenes there looked like flowers."

"Did they?"

"A little. They flew."

"Ah."

"Vapors jetted out their stems. They could only travel in short hops. But one doesn't look for faces in a flower."

"And here I have always mistaken you for a lily."

Iman turned from him and made a show of watching the debate of the others. "Will you call this place Maklouf's World? As team leader, it is your privilege."

Hassan shook his head. "I met Concannon once. He had an ego big enough for a world, but I'm not so vain as he. What do *you* think we should call this place?"

Iman pursed her lips and adjusted the *hijab* under her chin. Her face was only a pale circle wrapped in a checkered cloth of red and white squares after the fashion of the Jordan Valley. "We should learn what the indigenes call it in their own tongue."

Hassan laughed. "They will call it 'the world,' and likely in hundreds of tongues, most of which we will never hear."

"Shangri-la!" said Bashir, loud enough that Hassan heard and turned toward him. Yance clapped his hands. "Perfect!" he agreed. "This place is sure enough a paradise." Klaus nodded slowly, as did Ladawan and Khalid, the gate warden. Soong said nothing and glanced at Hassan.

"No." Hassan stepped inside the pavilion. "That is a dangerous name for a world, and dangerous because it sounds so safe. Every time we spoke it we would think this place safer yet."

"Well, isn't it?" asked Iman.

Hassan looked back over his shoulder and saw her run a hand along the muscled lifting arm of her statue. "I don't know," he said. "I haven't seen the surprise yet."

"Surprise?" asked Bashir. "What surprise is that?"

Soong chuckled, but Hassan didn't bother to answer. He continued to watch Iman stroke the statue.

"Well, what would *you* call it?" Yance asked, making it sound a challenge.

"It *is* your privilege, Hassan," said Mizir.

"If you must have a name for this world," and Hassan looked again outside the tent, at the strange constellations above, at the expressionless, immobile "face" on the statue. "If you must have a name for this world, call it al-Batin."

Mizir stiffened, Bashir and Khalid exchanged glances. Iman smiled faintly. "It means, 'The Hidden,'" she whispered to the others.

"Not exactly," Hassan added.

"It is one of the Names of God," Mizir protested. "That isn't proper for a planet."

"It is fit," Hassan said, "for as long as God hides its nature from us. After that . . . After that, we will see."

They called the city "East Haven" because of its position on a broad and deep estuary. A channel led from the Eastern Sea well into the mouth of a swift river—to embrace piers, docks, warehouses. This much they learned from high altitude sonar pictures from their drones. Why no ships nestled at those docks, the drones could not say.

South and west of the city lay flatlands thick with greening crops, by which they guessed at a season much like late spring. The crops were broad and flat, like clover, but whether intended for the Batinites or for their livestock was unclear. Harrows and cultivators were drawn by teams of six-legged creatures the claws of whose mid- and hindlegs had nearly vanished into a hoof-like structure. Its forelegs stubbornly divided the hoof. Inevitably the team named them "horses," although something in their demeanor suggested "oxen," as well.

One field was more manicured, covered by a fine ground-hugging carpet of waxy, fat-leafed, yellow-green plants, broken here and there with colorful flowers and shrubs arranged in decorative patterns. A sample of the "grass," when crushed, gave forth a pleasant odor—somewhat like frankincense. The park—for such they assumed it was—spread across the top of a swell of ground and from it one gained a fine vista of the city, its port, and the Eastern Sea beyond. As the weather grew warmer, groups of Batinites ventured forth from the city to spend afternoons or sunsets there, spooning baskets of food into their gaping stomachs and watching their younglings leap and somersault through the chartreuse oil-grass.

A road they called the Grand Trunk Road ran southwest from the city. The portions nearest the city had been paved with broad, flat stones, across which rattled a motley array of vehicles: carriages resembling landaus and hansoms, open wagons that Yance called "buck boards," and freight wagons heavy with goods and strapped with canvas covers, whose drivers goaded their teams of oxen six-horses with enormously long whips.

The Batinites themselves dressed in garb that ranged from pale dun to rainbow plumage, as task or mood dictated. They had a taste for beauty, Iman told the others, though for a different sort of beauty than Earth then knew, and she spent some of her free time adapting local fashion to the limbs and stature of humans—for there was a fad for matters alien in the cities of the Earth.

One fork of the Grand Trunk Road branched northwestward toward a pass in the coastal range of which the Misty Mountain was a part. The road simplified itself as it receded, like a countryman shedding his urban clothes piecemeal as he fled the city: it became first hard-driven gravel then earth damped with a waxy oil, finally, as it began the long switchback up to the pass, rutted dirt. The drone they sent through the pass returned with images of a second, more distant city, smaller than East Haven and nestled in a rich farming valley. Beyond, at the limits of resolution, lay drier and more barren country and the hint of something approaching desert.

"There is something energetic about those people," Hassan observed. "They have a commotion to them, a busyness that is very like Americans. They are forever *doing* something."

"*That* is why the city seems so odd!" Iman exclaimed, a cry so triumphant that, following as it did so many weeks of study, seemed tardy in its proclamation, as if the sociologist had been paying scant attention 'til now.

"Don't you see?" she told them. "They *are* Americans! Look at the streets, how linear they are. How planned. Only by the docks do they twist and wander. That city did not *grow* here; it was *planted*. Yes, Mizir, you were right. They came from across the Eastern Sea."

A lively people, indeed. One of a pair of younglings capering in the park caromed off a six-cedar tree and lay stunned while its parents rushed to comfort it. Three parents, Iman noted, and wondered at their roles. "Or is the third only an uncle or aunt or older sibling?" Yet the posture of consolation is much the same on one world as another and tentacles could stroke most wondrous delicate.

"They care for one another," Iman told Hassan that evening in the pavilion.

"Who does not?" he answered, rising from the divan and walking out into the night toward the vantage point from which they watched the city. East Haven was a dull orange glow. Oil from the chartreuse grass burned slowly in a hundred thousand lamps. Iman joined him and opened her mouth to speak, but Hassan silenced her with a touch to the arm and pointed to the shadow form of Bashir, who sat cross-legged on a great pillow and watched with night-vision binoculars. Silently, they withdrew into Hassan's pavilion, where Hassan sat on an ottoman while Iman, standing behind him, kneaded his shoulder muscles.

"You've been carrying something heavy on these," she said, "they are so hard and knotted up."

"Oh, nothing much. A world."

"Listen to Atlas." She squeezed hard and Hassan winced. "Nothing you can do will affect this world. All you do is watch."

"People will come here for the wonderfall, for the oil-grass perfume, for the fashion and cut of their clothing. In the end, that cannot go unnoticed."

"What of it? To our benefit and theirs. One day we will greet them, trade with them, listen to their music and they to ours. It is only the when and the how that matter. I think you carry a weight much less than a world."

"All right. The eight of you. That is heavy enough."

"What, are Soong and Mizir children that you must change their diapers? Or I?"

That conjured disturbing thoughts. He reached back over his shoulder and stilled her ministrations. "Perhaps you had better stop now."

"Am I so heavy, then?"

"It's not that. You scare me. I don't know who you are."

"I am as plain as typeset. Children read me for a primer."

"That's not what I meant."

"Do you wonder what is beneath the *hijab*? I could take it off."

The fire ran through him like a molten sword. He turned on his pillow and Iman took an abrupt step back, clasping her hands before her. "We've never been teamed before, you and I," he told her. "What do you know about me?"

"I know that Bashir is not so heavy as you think."

Hassan was silent for a while. "He grows no lighter for all your assurances."

"What can happen to him here?"

"Very little, I think," he admitted reluctantly. "And that is dangerous, for his next world may not be so safe."

"I think he likes the Batinites."

"They are easy folk to like."

"There are more such folk than you might think."

"I think you are bald. Beneath the *hijab*, I mean. Bald, and maybe with ears like conch shells."

"Oh, you are a past master of flattery! You and I may never team again. You will go through a gate and I will go though another, and maybe one of us will not come back."

"I am no Shi'a. I do not practice *muta'a*."

Iman's face set into unreadable lines. "Is that what you think? A marriage with an expiration date? Then perhaps you do not know me, after all." She went to the flap of his pavilion and paused a moment slightly bent over before passing without. "It's black," she said, turning a bit to cast the words back. "Black and very long, and my mother compared it to silk. As for the ears, that price is higher than you've paid so far."

With that, she was gone. Hassan thought they had quarreled. *I have seniority*, he told himself. *She will join Soong and Mizir and me when we next go out*. He could arrange that. There were people in the House of Gates who owed him favors.

The next day, Hassan sent Bashir back to Earth for supplies and because he was so young, sent Mizir to accompany him and Khalid to drive the other-bus. They took discs full of information and cases of specimens for the scholars to study. "Check calibration on clock," Soong reminded them as they buttoned down. "Time run differently in Other 'Brane."

"Thank you, O grandfather," said Khalid, who had driven many such runs before, "I did not know that."

"Insolence," Soong complained to Hassan afterward. "Reminder never hurt."

"Makes me nervous having only the one buggy left," Yance said. "Y'know what I mean? We can't get all of us and all our gear into one, if'n we have to bug out in a hurry."

"Bug out?" Soong thought the word related to "buggy."

"Y'never know," Yance said, feigning wisdom by saying nothing, so that Soong was no more enlightened.

That evening, Klaus came to Hassan with a puzzle. "These are for today the surveillance flights over 'Six-foot City'."

"Don't call the natives 'six-foots.' What's on the videos?"

"I hope that you will tell me."

Klaus was usually more forthcoming. He had the German's attitude toward facts. He ate them raw, without seasoning, and served them up the same way. There was something brutal about this, for facts could be hard and possess sharp edges, making them hard to swallow. Better to soften them a little first by chewing them over.

Klaus' video had been shot at night and had the peculiar, greenish luminescence of night vision. The time stamp in the lower right named the local equivalent of three in the morning. The drone had been conducting a biosurvey over the tidal flats north of the city—Mizir had spotted some peculiar burrowing creatures there on an earlier flyover—and during the return flight, motion in the city below had activated the drone's sensors.

"It is most peculiar," Klaus said. "Most peculiar."

How peculiar, Hassan did not know. Perhaps it was customary for large groups of the Batinites to wake from their sleep and come outdoors in the small hours of the morning, although they had never done so before. Yet, here they were in their multitudes: on balconies, on rooftops, at their windowsills, in small knots gathered before the doorways of their buildings. All turned skyward with a patient stillness that Hassan could only call expectation. The drone had lingered in circles, its small Intelligence sensing an anomaly of some sort in the sudden mass behavior. And then, first one worldling, then another pointed skyward and they began to behave in an agitated manner, turning and touching and waving their tentacled upper arms.

"Have they seen the drone?" Hassan asked. It was hard to imagine, stealthed as it was and at night in the bargain. "Perhaps they sense the engine's heat signature?" Mizir had floated the hypothesis that some of the gelatin pits on the headball were sensitive to infrared.

"No," said Klaus, "observe the direction in which they stare. It is to the east, and not directly above."

"How do you know which way they stare, when they have no faces?" In truth, it was difficult to judge in the unearthly light of night-vision. Everything was just a little soft at the edges, and features did not stand out.

"Look how they hold their bodies. I assume that their vision is in the direction in which they walk. It makes reason, not so?"

"Reason," said Hassan. "I wonder what reason brought them all out in the middle of the night?"

"Something in the sky. Ask Soong. Such a mystery will please him."

Hassan made a note to talk to Soong, but as he turned away, something in the panning video caught his eye, and that something was this:

When all men fall prostrate in prayer, the one who kneels upright stands out like bas-relief. When all men run, the one remaining still is noted. And when all men look off to the east, the one with face upturned seemed to be staring directly at Hassan himself.

Which was to say, directly at the drone. "This one," said Hassan, striking the freeze-frame. "What do you make of him?"

"So . . . I had not noticed him before." Klaus peered more closely at the screen. "A heretic, perhaps." But his chuckle stuck in his throat. "I meant no offense."

Hassan, much puzzled, took none. Only later would Mizir remind him that to a European, Mecca lies proverbially east.

"Planet," Soong announced with grave satisfaction after evening had fallen. "Most systems, many planets. This rising significant to sixlegs."

"Don't call them sixlegs. Why would it have special significance?"

Soong made a gesture signifying patient ignorance. "Perhaps beginning of festival. Ramadan. Fasching. Carnival."

"Ramadan is not a festival."

"So hard, keep Western notions straight," Soong answered. Hassan was never certain when Soong was being droll. "Is brightest object now in sky," the geophysicist continued, "save inner moon. Maybe next planet starward. Blue tint, so maybe water there. Maybe second living world in system!"

The next day, the worldlings went about their city bearing arms.

There had been little sign of a military hitherto, but now Havenites drilled and marched on the parkland south of the city. They ran. They jumped. They practiced ramming shot down the long barrels of their weapons. They marched in rank and file and executed intricate ballets to the rhythmic clapping of their lower arms. Formations evolved from marching column to line of battle and back again. The floral arrangements that had checkerboarded the park were soon trampled and their colors stamped into a universal sepia. It bothered Hassan when behaviors suddenly changed. It meant that the team had missed something basic. "Why?" he asked, watching through the binoculars, expecting no answer.

But he received one of sorts that evening: When the Blue Planet rose, some of the worldlings fired their weapons in its direction and raised a staccato tattoo that rose and fell and rippled across the city like the chop on a bothered sea.

"Fools," muttered Soong, but Hassan recognized defiance when he saw it.

"Of *planet*?" the Chinese scoffed. "Of *omen*?"

Iman was saddened by the guns. "I had hoped them beyond such matters."

"What people," Hassan said, "have ever been beyond such matters?"

Klaus grunted. "It will be like Bismarck's wars, I think. No radio, but they must have telegraphy. No airplanes, but a balloon would not surprise me."

Iman turned on him. "How can you talk of war with such detachment?"

But Klaus only shrugged. "What other way is there?" he asked. "All we can do is watch." Ladawan and Yance and the others said nothing.

The day after that, the second other-bus returned with fresh supplies and equipment. Mizir off-loaded a wealth of reagents, a sounding laser, and a scanning electron microscope. "It's only a field model," he said of the microscope, "but at last I can *see*!" Soong regarded the aerosondes and high-altitude balloons and judged them passable. "View from height, maybe informative," he conceded, then he turned to Mizir and grinned, "So I, too, look at very small things." A team of mechanics had come back with Bashir and Khalid and they set about assembling the ultralight under Yance's impatient eyes.

"They wanted to know if you'll let the other teams through yet," Bashir told Hassan.

"No."

"But . . . I told them—"

"It was not for you to tell them anything!" Hassan shouted, which caused heads to turn and Bashir to flinch. Hassan immediately regretted the outburst, but remained stern. "Something has developed in the city," he said brusquely, and explained about the rising of the Blue Planet, al-Azraq, and the sudden martial activity.

"The new star marks their season for *jihad*," Bashir guessed.

"Who ever had such seasons?" Hassan scolded him. "It is the struggle with our own heart that is the true *jihad*."

"Maybe so," said Yance, who had overheard, "but when folks are in a mood for a ruckus, any reason'll do." He studied the ultralight thoughtfully. "I just hope they don't have anti-aircraft guns."

Iman learned to recognize Batinites.

"They only look alike," she said, "because they are so strange, and the common strangeness overwhelms the individual differences."

"Yes," said Soong. "Like Arab curlicues. All letters look same."

"The Batinites do not have faces, exactly," Iman reminded them, "but the features on their headball are not random. There are always the same number of pits and ferns and they always appear in the same approximate locations . . ."

"No surprise there," said Mizir. "How many humans are born with three eyes, or with noses where their ears should be?"

". . . but the sizes of these features and the distances between them vary just as they do among humans. How else do we recognize one another, but by the length of the nose, the distance between the eyes, the width of the mouth . . ."

"Some mouths," Yance whispered to Bashir, "being wider than others."

". . . I have identified seventy-three eigenface dimensions for the Batinite headball. The diameters of the pits; reflectivity of the gelatin in them; the lengths of the fronds and the number and size of their 'leaves'; the hue of the skin-plates . . ."

"You don't have to name them all," Hassan said.

". . . and so on. All too strange to register in our own perception, but the Intelligence can measure an image and identify specific individuals."

"Are there systematic differences between the two races?" Mizir asked. "I think you will find the cobaltics have more and broader 'leaves' than the ceruleans."

"Why so they have! On the dorsal fronds."

Mizir nodded in slow satisfaction. "I believe those function as heat radiators, though I cannot be certain until I explore their anatomies. If the cobaltics are a tropical folk, they may need to spill their heat more rapidly. None of the mountain species here in our valley have those particular fronds—or any related feature. At this altitude, spilling excess heat is not a great problem."

"More evidence," Bashir suggested, "that the Havenites have come from somewhere else."

The Intelligence had been teasing threads of meaning from the great ball of yarn that was the Batinites' spoken tongues. The task was complicated by the presence of two such tongues, which the Intelligence declared to be unrelated at the fifth degree, and by the inferred presence of scores of specialized jargons and argots. "The folk at the docks," Klaus pointed out, "must have their own language. And the thieves that we sometimes hear whisper in the night."

"They don't whisper," Iman told him. "They hum and pop and click."

"Those pits on the headball," Mizir mused, "are drums. Wonderfully adapted. They no more evolved for speaking than did human lips and tongue. They were recruited; and yet they serve."

"If they cannot speak from both sides of the mouth," Klaus observed, "they may sometimes say two things at once."

"The advantage of having more than one orifice adapted to making sounds."

Klaus made a further comment and laughed; but because he made it in German no one else got the joke, although it concerned making sounds from more than one orifice.

They input the murmuring of the crowd from the night when al-Azraq first appeared and the Intelligence responded with . . . murmuring, and the occasional cry of [the Blue Planet! It rises/appears!] and [expression of possible dismay and/or fear]. It was not a translation, but it was progress toward a translation.

There may have been another language, a third one, which made no use of sounds, for at times they observed two Batinites together, silent but in evident communication.

"It's the fern-like structures," said Mizir. "They are scent receptors. At close range, they communicate by odors."

"Inefficient," scoffed Klaus.

"Inefficiency is a sign of natural selection," Mizir assured him. "And some messages may be very simple. Run! Come!"

"It's not the scents," said Iman. "Or not the scents alone. Observe how they touch, how they stroke one another's fronds. They communicate by touching one another." She challenged the others with an upthrust chin and no one dared gainsay her, for she herself often communicated by touch. "What else is a handshake, a clap on the shoulder," she insisted, "or a kiss?"

They decided that the frond-stroking amounted to kissing. Some was done perfunctorily. "Like a peck on the cheek," Yance said. Some was done with great show. Some, indeed with lingering stillness. Whatever it meant, the Havenites did it a lot. "They are an affectionate people," Bashir said. Iman said nothing, but tousled the young man's hair.

Bashir had tele-piloting duty the night when a drone followed a soldier out into the park. This soldier wore an ill-fitting uniform of pale yellow on his high cerulean form, one unmarked by any of the signifiers of rank or status that the Intelligence had deduced. It rode a sixleg horse past neglected fields and up the gravel road that led to the once-manicured hilltop. It rode unarmed.

When it reached the level ground where the Haven folk had sported at games before taking up more deadly rehearsals, the soldier dismounted and spoke soft drumbeats, as of a distant and muffled *darbuka*.

Other drumbeats answered and a second Batinite, a tall slim cobaltic, emerged from the grove of six-cedar and poplar. The two approached and stood together for a while, intertwining their tentacled upper arms. Then the second spoke in two voices. One voice said [Show/demonstrate/make apparent—(to) me/this-one—you/present-one agency—immediate time] and the other said [Fear/dread/flight-or-fight—I/this-one agency—now-and-from-now]. At least so the Intelligence thought it said. Yet what manner of ears must they have, Bashir marveled, to parse a duet!

The soldier answered in like harmony, [Appears/shows—it/that-one agency—not-yet] and [this-one (pl?)—defiance/resolution/resignation (?)—now-and-from-now.]

The cobaltic had brought a basket and opened it to reveal covered dishes of the puree of grains and legumes that the Batinites favored on their picnic outings and which the Earthlings called batin-hummus. [Eat/take in—this item/thing—you/present-one agency—immediate time] and [Cook/prepare—I/this-one agency—past-time.]

The soldier had brought food as well: a thick, yellow-green liquid in pear-shaped bottles from which he pried the caps with a small instrument. The two removed their upper garments—a complex procedure in that four arms must withdraw from four sleeves—and exposed thereby the mouths in their torsos.

"I wonder if humans can eat those foods of theirs," Iman said. She had come up behind Bashir and had been watching over his shoulder. "A new, exotic flavor to excite the jades . . ." Ever since *al NahTHa,* the appetite for such things had grown and grown. The Rebirth, the Rediscovery. Art. Literature. Song. Science. Everything old was new again, and the new was gulped down whole.

"I've distilled a fluid from the oil-grass," Mizir told them. He sat at the high table drinking coffee with Ladawan and Klaus. "But whether I have obtained a drink or a fuel I cannot say. Yance will not let me put it in the ultralight's gas tank; but he will not drink it for me, either." The others laughed and Klaus indicated Mizir's small, exquisite mug, whose contents had been brewed in the Turkish fashion. "My friend, how would you know the difference?"

"Coffee," said Mizir with mock dignity, "is more than hot water in which a few beans have passed an idle moment." He took his cup and left the table to stand with Iman and Bashir. "Hassan?" he asked her through lips poised to sip. Iman shook her head and Mizir said, "He is always cautious when encountering a new world." He turned his attention to the screen just as the soldier ran its tentacles across the fronds of the taller one's headball and then . . . inserted those tentacles into its own mouth. "What is this?" Mizir said, setting his cup on its saucer and bending closer.

"A new behavior," Iman said delighted and pulled her datapad from her belt pouch. "Bashir, what is the file number on the bird's download? I want to view this later." She entered the identifier the boy gave her and with her stylus scratched quick curlicues across the touch-screen. "Into the oral cavity . . ." she mused.

"What does it mean?" Bashir asked, and no one could tell him.

Usually the Batinites fed themselves by gripping spoons or tines with an upper hand, most often with the left. Sometimes, though rarely, they held food directly using one of their middle hands, typically the right. ("Complementary handedness," Mizir had called it.) Yet the two Batinites on this double-mooned evening abandoned their spoons to their awkward middle hands, while their delicate and tentacled uppers entwined each other's like restless snakes.

Then the cobaltic reached directly into the cerulean's mouth orifice. The soldier grew very taut and still and laid its bowl of batin-hummus slowly aside. With its own tentacles it stroked the other's scent receptors or touched briefly certain of the pits on the cobaltic's headball. Mizir, entranced by the ritual, made careful note of which pits were touched on a sketch of the headball. Iman made notes as well, though with different purpose.

Using its large middle hands, the soldier took the cobaltic by the torso and pushed gently until the other had disengaged and the two pulled away from each other. "Look! What is that?" Bashir asked. "Inside the soldier's mouth!"

"A 'tongue' perhaps," Mizir said. "See how it glistens! Perhaps a mucous coating. A catalyst for digestion?"

Iman looked at him a moment. "Do you think so?" Then she turned her attention to the screen and watched with an awful intensity. She placed a hand on Bashir's shoulder and leaned a little on him. When the two Batinites brought their mouths together, her grip grew hard. Bashir said, "Why, they're kissing!"

Mizir said doubtfully, "We've seen no such kisses before among them. Only the brief frond stroke."

"This is more serious than the frond stroke, I think," Iman said.

"It's a rather long kiss," said Bashir.

"The mouth and tongue are the most sensitive organs of touch that humans possess," she told him, "aside from one other."

Hassan, drawn by the interest of the three clustered before the telescreen, had come up behind them. Now he said, "Turn that screen off!" with a particular firmness.

It was at that moment that Bashir realized. "They weren't kissing! They were . . . I mean . . ." He blacked the screen, then turned to Iman. "You knew!" But Iman had turned round to face Hassan.

"You're right," she said. "They deserve their privacy."

Klaus and Ladawan had joined them. "What is befallen?" the technologist asked.

Iman answered him without turning away from Hassan. "There is a struggle coming, a *jihad* of some sort, and two who may never see each other again have stolen a precious night for their own."

Klaus said, "I don't understand."

Ladawan told him. "A lover is bidding her soldier-boy good-bye."

Mizir was doubtful. "We don't know which one is 'he' or 'she.' They may be either, or neither, or it may be a seasonal thing. Among the fungi—"

"Oh, to Gehenna with your fungi!" said Iman, who then turned from the still-silent Hassan and stalked to her own tent. Mizir watched, puzzled, then turned to Hassan and continued, "I really must study the process. That 'tongue' must have been a . . ."

"Have the Intelligence study it, or do it in private," Hassan ordered. "Grant these people their dignity."

Klaus tugged Mizir on the sleeve as the biologist was leaving. "The soldier is probably the male. At this level of technology, no society can afford to sacrifice its females in combat."

Oddly, it was Ladawan, who was usually very quiet, who had the last word. "Sometimes," she said, "I do not understand you people." She told Soong about it later and Soong spoke certain words in Mandarin, of which tongue Ladawan also knew a little. What he said was, "Treasure that which you do not understand."

Two things happened the next day, or maybe more than two. The first was quite dramatic, but not very important. The second was not so dramatic.

Yance Darby brought forewarning. He had taken the ultralight out in the morning and had flown a wide circuit around the backside of the Misty Mountain to avoid being seen from East Haven. The ultralight was stealthed in the same manner as the drones and its propeller was hushed by MEMS; but it was larger and hence more likely to be detected, so he needed a flight path that would gain him sufficient altitude before passing over habitations. Yance had followed a river across the Great Western Valley to where it plunged through a purple gorge in the mountain range and so onto the coastal plain.

There was a small town at the gorge

and another a little farther downstream on the coastal side of the mountains, but the mouth of this river was a morass of swamps and bayous and there was no city there as there was at East Haven. Yance reported, "Cajuns in the delta," but no one at the base camp understood what he meant at first: namely, trappers and fishers living in small, isolated cabins.

"Two of 'em looked up when I flew past," he mentioned.

That troubled Mizir. "I think the indigenes sense into the infrared. The waste heat of our engines is minimal, but . . ." The team had occasionally noted locals glancing toward passing drones, much as a human might glance toward a half-seen flicker of light. Hassan made a note to schedule fewer night flights, when the contrast of the engine exhaust against the deep sky was greater.

A large covered wagon accompanied by five horsemen set out from East Haven on the Grand Trunk Road, but the humans paid it no mind, as there was often heavy traffic in that direction.

Yance followed the line of the mountains out to sea. Soong thought that there might be islands in that direction, a seamount continuation of the mountain range, and Mizir lusted to study insular species to see how they might differ from those they had found on the coastal plain, the river valley on the western slope, and their own alpine meadow. To this end, Yance carried several drones slaved to the ultralight to act as outriders.

What they found was a ship.

"You should see the sunuvabitch!" he told them over the radio link. "It's like an old pirate ship, sails all a-billow, gunports down the sides, cutting through the water like a plough. Different shape hull, though I couldn't tell you just how. Wider maybe, or shorter. And the sails—the rigging—aren't the same, either. There's a sunburst on the main sail."

"They don't use a sunburst emblem in the city," Klaus said. "The six-eagle seems to be the local totem." He meant the ferocious bird with claws on its wings and feet and covert.

"It's not a totem," Hassan said. "It's an emblem. Didn't your people use an eagle once?"

"The Doppeladler," Klaus nodded. "But it *was* a totem," he added, "and we sacrificed a great many to it."

"Maybe it's an invasion force," Bashir said. "Maybe this is why the Haven folk have been preparing for war."

"A single ship?" said Hassan.

"A *first* ship," Bashir said, and Hassan acknowledged the possibility.

"I would hate to see these people attacked," Bashir continued. "I like them. They're kind and they're clever and they're industrious."

Hassan, who had bent over the visual feed from Yance's drone, straightened to look at him. "Do you know of Philippe Habib?"

"Only what I was taught in school."

"He was clever and industrious, and they say that he was kind—at least to his friends, though he had not many of those."

"He was a great man."

"He was. But history has a surfeit of great men. We could do with fewer. The *Légion Étrangère* was never supposed to enter France. But what I tried to tell you is that we do not know the reasons for this coming struggle. The 'clever and industrious' folk we have been observing may be the innocent victims of a coming attack—or an oppressive power about to be overthrown. When the Safavid fought the Ak Kolunyu, which side had justice?"

"Cousin, I do not even know who they are!"

"Nor do you know these folk on the plains. Yance, conduct a search pattern. See if there is a flotilla or only this one vessel."

But it was only the one vessel and it furled its sails and entered East Haven under steam to a tumultuous but wary welcome. There was much parading and many displays and the sailors and marines aboard the ship—who wore uniforms of crimson and gold decked with different braid and signifiers—had their backs slapped and their fronds stroked by strangers in the city and not a few had their orifices entertained in the evening that followed.

("Sailors," observed Klaus, "are much the same everywhere.")

A ceremony was held in the park. Flags were exchanged—a ritual apparently of some moment, for the ruffles and paradiddles of drum-like chatter rose to a crescendo. Ugly and entirely functional sabers were exchanged by the ship's captain and a high-ranking Haven soldier.

"I believe they are making peace," Iman said. "These are two old foes who have come together."

"That is a seductive belief," Hassan said. "We love it because it is our belief. How often in Earth's past have ancient enemies clasped hands and stood shoulder to shoulder?"

"I like the Havenites better than the Sunburst folk," Bashir stated.

Hassan turned to him. "Have you chosen sides, then—at a *peace* ceremony?"

"Remember," said Iman, "that Haven uses a bird of prey as its sigil. A golden sun is entirely less threatening an emblem."

"It's not that. It's their uniforms."

"You prefer yellow to crimson?"

"No. The Havenite uniforms fit more poorly, and their insignia are less splendid. This is a folk who make no parade of fighting."

Hassan, who had begun to turn away, turned back and looked at his young cousin with new respect. "You are right. They are no peacocks about war, like these fancy folk from over the sea. And that is well, for it is no peacock matter. But ask yourself this: *Why* do old enemies come together?"

Mizir chortled over the images he and Iman were collecting of the newcomers. "Definite morphological differences. The fronds on their headballs show a different distribution of colors. There are more of the greenish sort than we have seen in the city. And the Sunbursters are shorter on the average."

Ladawan told them that the Intelligence had found close matches between the phonemes used by the sailors and those used by the city folk. "They are distinct tongues—or perhaps I should say distinct 'drums'—but of the same family. That which the cobaltics here sometimes speak is quite different."

After the ceremony in the park, there was raucous celebration. Music was created—by plucking and beating and bowing. "They know the cymbal and the xylophone and the fiddle," said Iman, "but not the trumpet or the reed."

"One needs a mouth connected to a pair of lungs for that sort of thing," Mizir told her.

"But, oh, what four hands can do with a *tunbur*!" And indeed, their stringed instruments were marvels of complexity beside which *tunbur*, guitar, *sitar*, violin were awkward and simple. Clawtips did for plectrums and tentacles fretted and even bowed most wondrously.

There was dancing, too, though not as humans understood the dance. They gyrated in triplets, Sunbursters and Havenites together, clapping with their lifting arms while they did. Mizir could not tell if the triplets were single or mixed gender. "You have to reach into the thorax opening and call forth the organ," he said. "Otherwise, who can tell?"

"Not I," Iman answered. "I wonder if they can. A people whose gender is known only through discovery will have . . . interesting depths." She glanced first at Hassan, then at Mizir, who winked. The sound of the clapping in the parkland evolved from raindrop randomness to marching cadence and back again, providing a peculiar ground to the intricate, contrapuntal melodies.

The team gave up trying to make sense of the great babble and settled for recording everything that transpired. But dance is contagious, and soon Khalid and

Bashir had coaxed the other men into a line that strutted back and forth while Iman clapped a rhythm and Soong and Ladawan looked on with amused detachment. Caught up, Hassan broke from the line into a *mesri*, and Iman with him. They bent and swiveled and they twisted their arms like serpents in challenge and response, while Khalid and Bashir clapped 11/4-time and Mizir mimed throwing coins at them until, finally exhausted, they came to a panting halt, face to face.

It was only a moment they stood that way, but it was a very long moment and whole worlds might have whirled about like Sufis while they caught their breath. Then Iman straightened her *hijab*, which the dance had tugged askew. Hassan thought he saw a dark curl of escaped hair on her shiny forehead. She gave him a high look, cocking her head just so, and departed for her tent. Hassan was left standing there, wondering if he was supposed to follow or not, while Soong and Mizir looked to each other.

He did pass by her tent on his way to sleep and, standing by the closed flap—he did not dare to lift it—said, "When we return to Earth, we will speak, you and I." He waited a moment in case there was a reply, but there was none, unless the tinkling of wind chimes was her laughter.

The morning dawned with mist. A fog had rolled in from the Eastern Sea and lay, a soft blanket, over everything. Hilltops emerged like islands from a sea of smoke. A few of the tallest buildings in Haven thrust above the fog, suggesting the masts of a sunken shipwreck. Frustrated, the drones crisscrossed the shrouded landscape, seeking what could be found on frequencies non-visual. Yance took the ultralight out again, and from a great height spied a speckling of islands on the horizon. Delighted, Soong placed them on the map and, with droll humor added, "Here there be dragons" to the blank expanse beyond. The Intelligence dutifully created a virtual globe and dappled it in greens and browns and blues. Yet it remained for the most part a disheartening black, like a lump of coal daubed with a few specks of paint.

"The Havenites came here from somewhere near where the Sunbursters live," Iman declared, tracing with an uncertain finger curlicues within the darkened part of the globe. "If only we knew where. The cobaltic folk may be indigenes, but I think they come from still a third place, and are strangers on these shores as well."

But fog is a morning sort of thing and the sun slowly winnowed it. The park, lying as it did on a swell of land, emerged early, as if from a receding flood and, as in any such ebb, was dotted with bits of debris left behind.

"There are five," Hassan told the others when he pulled his binoculars off. "Two of the bodies lie together, but the other three lie solitary. One is a marine off the foreign ship."

"Suicide?" wondered Iman. "But why?"

Soong said, "Not so strange. Hopelessness often follow unreasonable hope."

"Why was their hope unreasonable?" Bashir challenged him; but Soong only spread his hands in a helpless gesture, and Bashir cursed him as an unbeliever.

Hassan cased the binoculars. "People will do things behind a curtain that they otherwise entertain only in their hearts. There is something disheartening and solitary about fog. I suspect there are other bodies in the bushes."

"But, so many?" Mizir asked with mixed horror and fascination; for the Prophet, praise be upon him, had forbidden suicide to the Faithful.

Hassan turned to the tele-pilots. "Khalid, Bashir, Ladawan. Quickly. Send your drones to the park and retrieve tissue samples from the corpses. Seed the bodies with micromachines, so Mizir can explore their inner structures." Glancing at Mizir, he added, "That should please you. You've longed for a glimpse of their anatomy ever since we arrived."

Mizir shook his head. "But not this way. Not this way."

Bashir cried in distress. "Must you, cousin?"

Yet they did as they were told, and the drones swooped like buzzards onto the bodies of the dead. Clever devices no larger than dust motes entered through wounds and orifices, where they scurried up glands and channels and sinuses and took the metes and bounds of the bodies. "Quickly," Hassan told them. "Before the folk from the city arrive to carry them off."

"The folk in the city may have other concerns," Iman said. When Hassan gave her a question in a glance, she added, "Other bodies."

"I don't understand," said Bashir. "They seemed so happy yesterday, at the peace ceremony."

"How can you know what they felt?" Hassan asked him. "We may have no name for what they felt."

Yance said, "Maybe it was a sham, and the Sunbursters pulled a massacre during the night." But as a practical matter, Hassan doubted that. The ship had not borne enough marines to carry out such a task so quickly and with so little alarm.

Before the fog had entirely dissipated Hassan ordered the drones home, and thither they flew engorged with the data they had sucked from the bodies, ready to feed it to the waiting Intelligence. On the scrublands south of the park, a covered wagon had left the road and stood now near the base of the Misty Mountain exposed in the morning sun and bracketed by three tents and a picket line of six horses. Sensors warding the cliffside approach revealed five Batinites in various attitudes: tending the campfires, feeding the horses, and when the drones passed above, two of them turned their headballs to follow the heat track and one sprang to a tripod and adjusted its position.

"A surveyor's tripod," Klaus said when Hassan showed him the image. "They survey a new road, perhaps to those fishing villages in the southern Delta."

"I think these folk have seen our drones," Hassan decided.

"But our drones are stealthed," Bashir objected.

"Yes. And hushed and cooled, but they still leave a heat footprint, and against the ocean chill of this morning's mist they must stand out like a silhouette on the skyline."

"Still . . ."

"Among humans," said Iman, "there are those who may hear the softest whisper. Or see the shimmering air above the sands of *Ar Rub al-Khali*. Is it so strange if some of our Batinites have glimpsed strange streaks of sourceless heat in the sky?"

Hassan continued to study the last, backward-glancing image captured by the drones as they passed over the surveying party. A short-statured Batinite crouched behind the tripod, his tentacles adjusting verniers on an instrument of some sort. "If so, they may have taken a bearing on what they perceived."

"If they have," said Bashir, "what can they do? The cliff is sheer."

Hassan ordered that all drones be grounded for the time being and that no one stand in sight of the cliff's edge. "We can watch the city with the peepers we have already emplaced." Yance was especially saddened by the order and said that he could still fly over the western slope of the mountains, but Hassan pointed out that to gain the altitude he needed he must first circle over the very scrublands across which the surveying party trekked. "It will be for only a little while," he told his team. "Once they have laid out the road and have returned to the City, we will resume the flights." The one thing he had not considered was that the party might not be blazing a road. This did not occur to him until after Iman brought him the strange report from the Intelligence.

"There is no doubt?" he asked her, for even when she had placed the two images side by side, Hassan could not be sure. Not so the Intelligence, which, considering only data, was not distracted by strangeness.

"None at all. The images are identical down to the last eigenface. The surveyor in your road party is the same individual who followed the flight of the drone on the night the Blue Planet rose."

Soong, listening, said, "Remarkable! First Batinite twice seen."

Hassan picked up the first image and saw again the headball turned against the grain of that agitated crowd. "I do not trust coincidence," he said. "I think he has been taking vectors on each sighting of a heat trail, and has set out to find their source."

Iman sensed his troubled mind. "Should we prepare to evacuate?"

"No!" said Bashir.

"When you are more seasoned, young cousin," Hassan told him, "you may give the orders." To Iman: "Not yet. But all may depend on what is under the tarp on his wagon."

Which was, as they learned a few days later, a hot-air balloon. Klaus was delighted. "Ja! Very like Bismarck's age. Railroads, telegraphs, sailing ships with steam, and now balloons. The technological congruence! Think what it implies!"

Hassan did not wait to hear what it implied but walked off by himself, away from the tele-pilot booths and the tent flaps snapping in the dry mountain breeze. Iman followed at a distance. He paused at the shimmering gate and passed a few words with Khalid that Iman did not hear. Then he continued through the meadow, his legs kicking up the sparkling colored pollen from the knee-high flowers, until he reached the place where the wonderfall plummeted from very the top of the world. There he stood in silence gazing into the hidden depths of the pool. Mist filled the air, saturated it, until it seemed only a more tenuous extension of the pool itself. After watching him for a while, Iman approached and stood by his side.

Still he said nothing. When a few moments had gone past, Iman took his hand in hers; not in any forward way, but as one person may comfort another.

"I wonder where it goes?" he said at last, his voice distant beneath the steady roar. "All the way into the heart of the world, I think. But no one will ever know. Who could enter that pool without being crushed under by the force of the water? Who could ever return against that press to tell us?"

"Will you order evacuation?" She had to bend close to his ear to make herself heard.

"Do you think we should?"

"I think we should meet these people."

Hassan turned to regard her, which brought them very close together. *The better to hear over the roar*, he told himself.

"We are not forbidden contact," Iman insisted. "Circumstances vary from world to world. When to make contact is a judgment each captain must make."

"Though few are called upon to make it. I never have. Concannon never did. Life is rare. Sentient life rarer still. Sentient life robust enough to endure contact, a jewel. Your flying flowers were not sentient."

"No. They were only beautiful."

He laughed. "You are as hidden as this world."

"Shall I remove the *hijab*?" Fingers twitched toward her head-scarf.

He reached out and held her wrists, keeping her hands still. "It is not the *hijab* that hides you. You could remove all of your clothing and reveal nothing. Are the Batinites beautiful, too? You told us that once."

"Yes. Yes they are, in their own way. But they prepare for war and cry defiance; and dance when enemies make friends; and sometimes, in the dark, they kill themselves. How can we go and never know who they are?"

Hassan released her and, stooping, picked up a fallen branch of six-elder wood. Like all such vegetation in that place, it was punkish in its texture, breaking easily into corded strings and fibers. "It doesn't matter." Then, seeing as she had not heard him over the roar of the falls, he came very close to her face. "Our curious friend will have his balloon aloft before we could gather up this scatter of equipment and pack it away. And we cannot hide ourselves in this meadow, if he can see our heat. So the decision to initiate contact is his, not mine, whether he knows it or not." He threw the branch into the churning waters of the pool, and the maelstrom took it and it was gone. Hassan stared after it for a while, then turned to go. Iman placed her hand in the crook of his arm and walked with him.

She said when they were away from the wonderfall and voices could be voices once again and neither shouts nor whispers, "One other thing, you could do."

"What?"

"We have the laser pistols in the bus lockers. You could burn a hole in his balloon before he even rises from the ground."

"Yes. A hole mysteriously burned through the fabric. A fine way to conceal our presence."

"As you said, we can not conceal ourselves in any case. To burn his balloon would buy us the time to leave unobserved."

"Yes . . . But that's not what you want."

"No, I want to meet them; but you need to consider all your options."

"Can the Intelligence translate adequately for a meeting?"

"Who can know that until we try?"

Hassan laughed. "You are becoming like me."

"Is that so bad?"

"It is terrible. One Hassan is more than enough. One Iman will barely suffice."

The others had gathered at the pavilion, some at the ropes, as if awaiting the command to strike camp. The ultralight technicians were gathered in a group at one end of the camp. Whichever the decision, they would be leaving on the next supply run. Bashir caught Hassan's eye and there was a pleading in his face. Only Soong remained engrossed in his instruments. The world could end. God could clap his hands and mountains dissipate like the clouds, and Soong would only monitor the opacity and the density of their vapors.

To the technicians, Hassan gave a comp-pad containing his interim report and told them to carry it straight to the director's office on their return. "I've called for a contact follow-up team." Bashir and some of the others let out a cheer, which Hassan silenced with a glare. "I think our Batinite balloonist has shown sufficient enterprise that he deserves the fruit of it. But this decision has come on us too quickly and I dislike being rushed."

Passing Mizir on the way to his own pavilion, Hassan clapped his old colleague on the shoulder. "Once we have established contact, you will no longer need wonder about this world's ecology. Their own scholars will give you all the information you want."

Mizir shook his head sadly. "It won't be the same."

Later, Hassan noticed that Soong had not moved from his monitors. Through long acquaintance, Hassan knew that this was not entirely unworldliness on the man's part. So he joined the other at the astronomy board, though for several moments he did not interrupt Soong's concentration, allowing his presence to do for a question.

After a while, Soong said as if to the air, "At first, I think: *moonlet*. Strange skies, these, and we not know all out there. But orbit very low. Ninety-minute orbit." He pointed to a tiny speck of light that crossed the screen. "Every ninety minute he come back. Yesterday five. Today, ten, maybe twelve."

"What are they?" Hassan asked. "You said moonlets?"

"Only see when catch sunlight. Maybe many more, not see."

"Perhaps al-Batin has a ring of small moons . . ." But Soong was shaking his head.

"Two big moons sweep low-orbit free."

"Then what. . . ?"

"Men go to moon, long time past. Go to Mars. I think now we see . . ."

"Rocket ships?" Hassan stood up, away from the screen where last night's telescope data replayed and looked into the pale, cloud-shrouded sky. "Rocket ships," he whispered.

"I think," said Soong, "from Blue Planet."

Soong's discovery added another layer of urgency to the team's activities. "A second sapient, and in the same system!" said Iman. "Unprecedented," said Mizir. "We should leave, now," said Klaus; and Yance agreed: "We can stay hid from the folks here, but maybe not from these newcomers."

"We have to stay!" Bashir cried. Soong himself said nothing more than that this would complicate matters, and it seemed as if the complications bothered him quite more than other possibilities. Hassan retreated to his tent to escape the din and there he pondered matters.

But not too long. There was the balloonist to consider. Balloons and space ships, and here the Earthlings sat with a Nagy hypergate and vehicles that could travel in *the wrong direction*—and it was the Earthlings who were considering flight. There was something very funny about that. When Hassan emerged from his tent, everyone else stopped what he or she was doing and turned toward him in expectation. "Prepare for D&D," was all he said and turned back into his tent. He heard someone enter behind him and knew before turning that it was Iman.

Iman said, "Destruction and demolition. But . . ."

"But what?" Hassan said. "We cannot get everything into the buses quickly enough. We must destroy what we cannot take."

"But you had said we would stay!"

"The equation has been altered. The risks now outweigh the opportunities."

"What risks?"

"You heard Klaus. Folk with spaceships have other capabilities. We have grown careless observing the Batinites. These . . . these Azraqi will know radar, radio, laser, powered flight. Perhaps they know stealth and micromachines. I would rather they did not know of other-buses."

"But the chance to observe First Contact *from a third-party perspective*. . . !"

"We will stay and observe as long as possible, but with one hand on the latch-handles of our other-buses. Soong counted at least twelve ships in orbit, and the Batinites began re-arming some while ago. I do not think we will observe a First Contact."

The team powered down nonessentials, transferred vital samples and data to the other-buses, and policed the meadow of their artifacts. Mizir drafted the ultralight technicians, who had been acting detached about the whole affair. They reported to a different Section Chief than did the Survey Team, but the old man leered at them. "There are no idlers on-planet," he told them. Hassan spent the evening redrafting his report.

The next morning, Soong told him that the ships had begun to land. "One ship fire retro-burn while in telescope view. Intelligence extrapolate landing in antipodes. Other ships not appear on schedule, so maybe also de-orbit."

Hassan passed the word for everyone to stay alert and imposed radio silence on the team. "We are no longer so remote here on our mountain as we once were. We must be cautious with our drones, with radar pings. With anything that these newcomers might be able to detect."

He did not suppose that there was anything especially remarkable about their alpine meadow that the orbiting ships would have studied it from aloft, but he had the tents struck—they clashed with the colors—and moved the primary monitors beneath a stand of six-cedar. He ordered Khalid and Ladawan to bring the other-buses to idle, so that they would be a little out of phase with the Right 'Brane and, in theory, impossible to detect by any but *other* instruments. When they had all gathered under the trees, Hassan did a head count and discovered that Bashir was missing.

With many curses, he set out to look for him and found him by the edge of the cliff that overlooked the plains. Bashir lay prone with a pair of enhanced binoculars pressed to his eyes. Hassan, too, dropped prone upon the grass beside him—strange grass, too-yellow grass, velvety and oily and odd to the touch. Hassan remembered that he was on a distant and alien world and was surprised to realize that for a time he had forgotten.

Bashir said, "Do you think he knows? About the ships in orbit, I mean."

Hassan knew his cousin was speaking of the balloonist. "He knew they were coming. They all knew. When al-Asraq came into opposition, the ships would come. Someone must have worked out the orbital mechanics."

"He's coming to us to ask for help."

"Against the Asraqi."

"Yes. They are brave folk. Regimented companies in squares, firing one-shot rifles. Field cannon like Mehmet Ali had. And against what? *People in space ships*! What chance do they have, Hassan, unless we help them? 'Surrender to God and do good deeds.' Is that not what God said through his Messenger, praise be upon him?"

"Bashir, there are nine of us, plus the technicians for the ultralight. We have no arms but the four lasers in the weapons lockers. Only Klaus has any knowledge of military theory—and it is *only* theory. What can we possibly do?"

The attack was swift and brutal and came without warning. The shuttlecraft flew in low from the west, screaming over the crests of the mountains, shedding velocity over the ocean as they banked and turned. There were three of them, shaped like lozenges, their heat shields still glowing dully on their undersides. "Scramjets," said Klaus into his headset and the Intelligence heard and compiled the observation with the visuals. "Bring the cameras to bear," said Hassan. "Bring the cameras to bear. One is landing on the park. The second on the far side of the city. It may land in the swamp and be mired. Ladawan, we'll take the chance. Send a drone over that way. On a narrow beam. Yance, if the invaders put anything between us and the drone, destroy the drone immediately. Where did the third shuttle go? Where is it? Klaus, your assessment!"

"Mid-twenty-first-century equivalent," the German said. "Scramjet SSTOs. Look for smart bombs, laser targeting, hopper-hunters. High-density flechette rifles with submunitions. Oh, those poor bastards. Oh, those poor bastards!" Black flowers blossomed in the sky. "The Havenites have their field guns to maximum elevation. Low-energy shells bursting in the air . . . But too low to matter. Ach, for an AA battery!"

"You are choosing sides, Klaus."

The technologist lowered his binoculars. "Yes, naturally," he snapped; and the binoculars rose again.

"It is not our quarrel," Hassan said, but the Roumi was not listening to him.

"The second shuttle is in the swamp," Ladawan reported. "I do not think the Havenites expected that. They have few defenses on that side."

"I do not think the Asraqi expected so, either," Klaus said. "These shuttles have only the limited maneuverability. More than the first American shuttles, but not much more. They may have little choice in where they land."

"Where did the third one go?" Hassan asked.

Bashir raised an ululation. "It was hit!

It was hit! It flew into a shell burst. It's down in the surf."

"A lucky shot," said Klaus, but he too raised a fist and shook it at the sky.

"Listen to them cheer in the City," said Iman, who was monitoring the ears that they had planted during their long observation and study.

The other two shuttles released missiles, which flew into the City, and two of the tallest buildings coughed and shrugged and slid into ruin. Smoke and flame rose above the skyline. Hassan turned to Iman. "Did the cheering stop?" he asked, and Iman turned away from him.

"No, show me," Klaus said to Soong, bending over the screen where the drone's feed was displayed. The Chinese pointed. Here. Here. Here. Klaus turned to Hassan.

"I was wrong. The third shuttle made by intent the ocean landing. They have triangulated the City. Park. Swamp. Ocean. Look at it out there. See? It floats. They must be for both the water or ground landing designed."

Soong said, "Ah! I find radio traffic. Feeding data stream to Intelligence." He put the stream on audio and everyone in the team paused to listen for a moment. There was something liquid, something squishy, about the sounds. Frogs croaking, iguanas barking. Not computer signals, but voices. The sounds had an analog feel to them.

Bashir said, "The balloon is up."

Hassan turned to stare at him. "Are you certain? The man must be mad. To go up in *this*? Iman, Bashir, Khalid. Go to the cliff. I will come shortly." Hassan could not take his eyes from the dying city. Upping the magnification on his binoculars, he saw troops emerge from the first shuttle, the one that had landed in the park. "Close images!" he cried. "I want close images of those people."

"There are not very many of them," Mizir ventured.

"There do not need to be very many of them," Klaus told him. "These will be light airborne infantry. They are to hold a landing zone for the mother ship."

"You're guessing," Hassan said.

"*Ganz natürlich.*"

The landing force scattered into teams of three and fanned across the park. The Asraqi were bipedal, shorter than the Batinites, stockier. They wore flat black uniforms of a leathery material. Helmets with masks covered their faces—if anything like faces lurked under those masks. Skin, where it showed, was scaled and shiny. "Reptiloids," said Mizir, half-delighted to have a new race to study but not, under the circumstances, fully so. "The works of God are wonderfully diverse, but he uses precious few templates."

"Speculate," Hassan said. "What am I seeing?"

"The helmets are heads-up displays," Klaus said. "The mother ship has in Low Orbit satellites placed and the Lizards receive on the battle space, the information."

"If they are reptiloid," said Mizir, "they would likely come from a dry place."

Klaus pursed his lips. "But Earth has many aquatic reptiles, not so? And al-Asraq is watery."

"So it does!" cried Mizir, "but there are yet deserts. Besides, those may be *fish* scales. Amphibians. What do you expect from me from the glimpse of a single bare arm!"

"Mizir!" Hassan cautioned him, and the exobiologist took a deep calming breath and turned away.

"Hassan." It was Bashir's voice on the radio. "The balloonist is halfway up, but the winds are contrary, keeping him away from the cliff."

Hassan cursed and broke his own rule long enough to bark, "Radio silence!" He turned. "What is it, for the love of God? Khalid, I told you to go to the cliff and wait for the balloonist."

Khalid glanced at the progress of the battle on the large plasma screen. "Not a fair fight, is it. Here, sir. You may need this."

Hassan looked down at his hand and saw that the gate warden had given him a laser pistol.

"There are only four laser pistols," Khalid explained, "two in each bus. Ladawan and I keep one each. We are trained marksmen. I give one to you, because you are team captain. Who gets the fourth?"

"Warden, if the Asraqi attack us here, four laser pistols will do no good. Against a cruise missile?"

"Sir, they will do more good than if we were utterly disarmed."

Hassan tucked the pistol into his waistband. "Klaus?"

The German lowered his binoculars, saw what the gate warden had, and shook his head. "Military strategy is to me small squares on a map-screen. I have never fired a handgun. Give it to Yance. Americans make the *Fickerei* to pistols."

Soong reached up from his console seat. "I take."

Khalid hesitated. "Do you know how to use one?"

"I show you by burning rabbit." He pointed to a six-legged rodent on the far side of the meadow.

Khalid did not ask for the proof, but handed over the pistol. Soong laid it on his console.

"Do you shoot so well?" Hassan asked him after Khalid had gone to the cliffside.

"No, but now he does not give pistol to Yance. Too young, like your cousin. Too excitable. Better pistol with me. I not know use. But I *know* I not know use."

"The Batinites must have expected a landing in the park," Klaus announced. "They have a regiment in the woods concealed. Now they charge while the Asraqi they are scattered!"

Hassan paused in the act of leaving and watched while ranks and files decked in yellow marched from the woods to the drum-claps of their tympanums and their lower arms. He saw the corporals bawl orders. He saw the ranks dress themselves and two banners—the six-eagle and some device that was probably the regiment's own—rose aloft. The first rank knelt and both it and the second rank fired in volley, then they sidestepped to allow the next two ranks to pass through and repeat the process while they reloaded.

They managed the evolution twice before the invaders tore them apart. High velocity rounds from scattered, mobile kill squads firing from shelter shredded the pretty uniforms and the fine banners and splattered the six-cedars and ironwood and the chartreuse oil-grass with glistening pools of yellow-green ichor. A few cannon shots from the shuttle completed the slaughter. Nothing was left of the regiment but twitching corpses and body parts. Hassan wondered whether the young soldier they had once watched make love to his sweetheart lay among them.

"*O, les braves gens*," Klaus whispered, echoing a long-dead King of Prussia at a long-forgotten battle.

Hassan could bear to see no more. "Record everything," he barked. "The rest of you, get those buses packed. Power down any equipment whose source might be traced by those . . . lizards. Klaus . . . Klaus! Estimate the invaders' capabilities. What can we operate safely? At the moment, the Asraqi are . . . preoccupied; but sooner or later they'll bring down aircraft—or a satellite will chance to look down on this meadow. Leave nothing behind that those folk may find useful—and they might find anything useful!" He turned to walk to the cliffside, where the balloonist was attempting his ascent. Klaus said, "But, I thought we might . . . " Hassan silenced him with a glare.

When he reached the edge of the six-cedar grove that grew close to the cliffside, Hassan saw Iman monitoring the balloon through her goggles. She seemed an alien creature herself, with her head wrapped in a scarf and her face concealed by the glasses.

"He's using a grappling line," Bashir

announced as Hassan joined them. "He whirls it around, then throws it toward the cliff."

"Has he seen you?"

"No." It was Iman, who answered without taking her eyes off the balloonist. "A dangerous maneuver," she added. "He could foul his mooring rope, or rake the balloon above him."

"We've been watching the battle," Bashir said, "on our hand comms."

Iman lowered her glasses and turned around. Hassan glanced at Khalid, who squatted on his heels a little behind the others in the brush; but the warden's face held no expression. Hassan rubbed his fist and did not look at any of them. "It's not a battle. It's a massacre. I think the Batinites have killed two Asraqi. Maybe. The invaders evacuated their wounded into their shuttle, so who can say?"

"We have to *do* something!" Bashir cried.

Hassan whirled on him. "*Do we?* What would you have us do, cousin? We have no weapons, but the four handguns. Soong is clever, and perhaps he could create a super-weapon from the components of our equipment, but I do not think Soong is quite that clever. Yance could fly out in the ultralight and perhaps drop the gas chromatograph on someone's head—but he could never do that twice."

Iman turned 'round again. "Stop that! Stop mocking him! He wants to help. We all do."

"I want him to face reality. We can do nothing—but watch and record."

"We could send one of the buses back to Earth," Bashir entreated him, "and show them what's happening here. They'll send help. They'll send the Legion, or the American Marines, and we'll see how those *lizards* like being on the other side of the boot!"

"What makes you think that the Union, or the Americans, or *anyone* would send so much as a policeman? What interests do they have here?"

Bashir opened his mouth and closed it and opened it a second time. "They'd, they'd have to. These people need help!"

"And if they did send the Legion," Hassan continued remorselessly, "every last trooper would have to come through the gate. The Asraqi may be brutal, but they can not be stupid. One cruise missile to take out the gate and the whole expeditionary force would be trapped, cut off from home forever. Or the Asraqi would simply pick off whoever came through, seize the buses, and . . . What general would be mad enough to propose such a plan? What politician fool enough to approve it? What legionnaire suicidal enough to obey?"

Khalid spoke up. "And you haven't yet asked how we would move a force large enough to matter down a sheer cliff onto the plains."

"Thank you, warden," Hassan said, "but I think my cousin begins to understand. But there is one thing we can do," he added quietly.

Bashir seized on hope. "What? What can we do?"

"Little enough. We can give information—if the Intelligence has mastered enough of their speech. We can tell our balloonist friend about asymmetric warfare. About the Spanish *guerrilla* that tormented Napoleon. About Tito's partisans."

"Will that help?"

Hassan wanted to tell him no, that few irregular forces had ever triumphed without a secure refuge or a regimented army to back them. The *guerrilla* had had Wellington; Tito's partisans, the Red Army. "Yes," he told Bashir. Khalid, who may have known better, said nothing.

"He's latched hold," said Iman.

"What?"

"The balloonist," she told him. "His grapple. He's pulling the balloon toward the edge of the cliff to moor it."

"Ah. Well. Time to welcome the poor bastard."

"Why," asked Khalid of no one in particular, "with all that is happening to his city, does he insist on reaching this peak?"

"I think," said Hassan, "because he has nothing else left to reach for."

The Batinite headball cannot show expression, at least no expression that humans can read. Yet it was not hard to discern the emotions of the balloonist when, after he had clambered from the balloon's basket onto solid ground and secured it by a rope to the stump of a tree, the waiting humans rose from concealment. The Batinite reared nearly vertical, waving his tentacled upper arms in the air, and staggered backward. One step. Then another.

"No!" said Iman. "The cliff!" And she moved toward him.

Groping behind into the basket, the balloonist pulled out a musket and, before Hassan could even react to the sight, fired a load of shot that ripped Iman across the throat and chest. Hassan heard a pellet pass him by like an angry bee and heard, too, Bashir cry out in pain.

Grapeshot is not a high-velocity round; it did not throw Iman back. She stood in place, swaying, while her *hijab* turned slowly from checkerboard to black crimson. She began to turn toward Hassan with a puzzled look on her face, and Hassan thought she meant to ask him what had happened, but the act unbalanced her, and, sighing, she twisted to the ground.

Hassan caught her and lowered her gently the rest of the way. Speaking her name, he yanked the sodden *hijab* away and held her head to his breast. Her hair was black, he noted. Black, and wound tightly in a coiled braid.

The Batinite was meanwhile methodically reloading his musket, ramming a load down the muzzle, preparing for a second murder. With a cry, Hassan rose to his feet, tugged the pistol from his waistband, and aimed it at the thing that had come in the balloon. The red targeting spot wavered across the alien's headball. The laser would slice the leathery carapace open, spilling—not brains, but something like a ganglion that served to process sense impressions before sending them to the belly. Hassan shifted his aim to the belly, to the orifice from which might emerge slimy, unclean organs, behind the diaphragm of which Mizir had named the creature's life and thought.

He almost fired. He had placed his thumb on the activation trigger, but Khalid shoved his hand down and fired his own laser four times with cruel precision, burning the hands of the beast, so that it dropped the musket and emitted sounds like a mad percussionist. With a fifth and more sustained burn, Khalid ran a gash along the body of the balloon hovering in the sky beyond. The colorful fabric sighed—much like Iman had sighed—and crumpled in much the same way, too, hanging for a while on the rocky escarpment while the wind teased its folds.

Hassan dropped his pistol to the dirt unfired. He turned and walked into the alien cedars.

Khalid indicated the thrumming prisoner. "Wait! What are we to do with him?"

Hassan did not look back. "Throw it over the cliff."

Soong found Hassan at last in the place where he ought to have looked first, by the endless falls and bottomless pool at the far end of the mountain valley. There the team leader knelt on a prayer rug that he had rolled out on the damp earth and rock and prostrated himself again and again. Soong watched for a time. He himself honored his ancestors and followed, when the mood struck, an Eight-Fold Path. Perhaps there was a god behind it all, perhaps not. His ancestors were not forthcoming on the subject. Soot from the burning city had begun to settle on the plateau. Explosions boomed like distant thunder. If that were the work of a god, it was one beyond Soong's comprehending.

Hassan sat back on his haunches. "Why did she have to die?" he cried, loudly enough that even the roar of the falls was overcome.

Soong wondered momentarily whether Hassan had addressed him or his god before he answered. "Because pellets sever carotid artery."

Hassan hesitated, then turned around. "What sort of reason is that?"

"No reason," Soong said. "Westerners think *reason*, always *reason*. But, no reason. 'Shit happens.' Life is wheel. Someday you escape."

"Do not presume to question God."

"Gods not answer, however often asked. Maybe they not know, either."

"I can't even blame that poor bastard in the balloon." Hassan covered his face with his hands. "His planet has been invaded, his people massacred, the proudest achievements of his civilization exposed as less than nothing. What were we to him but more invaders? Tell me Khalid did not throw him over the cliff."

"He know not lawful order. But survival up here, more cruel. Without balloon, how he descend? With hands burned so, how he fend?"

"It was my fault, Soong. What sort of captain am I? I let al-Batin lull me. I should never have allowed Iman to approach him like that, without taking time to calm his fears."

"Not matter," said Soong. "He no fear. He hate."

"What do you mean? How can you know that?"

Soong spread his hands. "Maybe Intelligence not translate well. But say headball drum hate and loathing. We question him. Mizir, Khalid, me. This not first visit from Blue Planet. Asraqi come once before. Come in peace. Trade, discovery, I think. And Batinites kill all—for defiling holy soil of Batin."

"Without provocation?"

"Arrival provocation enough, balloonist say. Asraqi ship damaged, but some escape, come to Haven. Warn of terrible revenge, next approach, *but Batinites not care*. No logic, just fury. Kill survivors, too. Balloonist one of them. *Proud* to defend al-Batin. Remember, Hassan, he bring balloon here *before* Asraqi land, and bring gun already loaded. Not know *who* up here or *why*, only *someone* up here. Come to kill, not to greet."

"Xenophobes . . ." Hassan could not reconcile that with the gentle, carefree folk he had been observing for so long. And yet, the one never did preclude the other.

Soong shook his head. "Balloonist not hate Asraqi; only hate that they come."

"Does the difference matter? And is the Asraqi punishment not worse than the original crime?" Hassan did not expect an answer. He did not think that there ever would be an answer. He rolled his prayer rug and slung it over his shoulder. "Are the buses ready to go?"

Soong nodded. "Waiting for captain."

"Is . . . Is Iman on board?"

"In specimen locker."

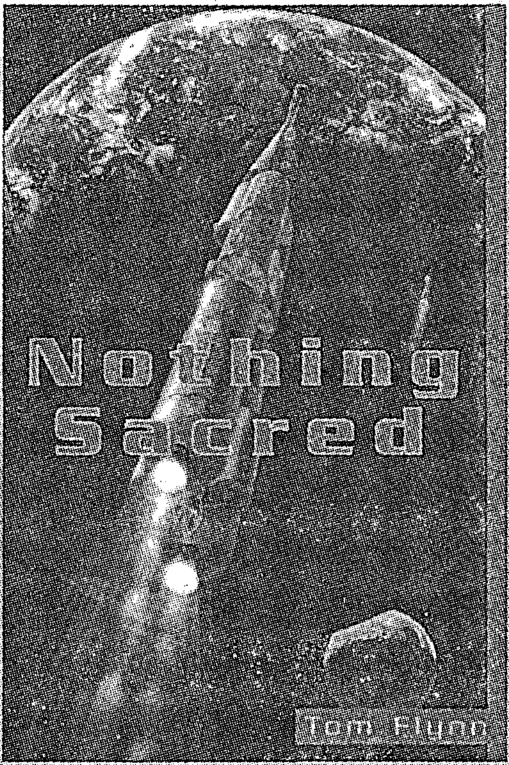
Hassan winced. "I'm ordering Khalid to seal the gate. No one comes back here. Ever."

"Too dangerous," Soong agreed.

"Not in the way you think."

From a world named The Hidden by humans, humans departed. The gate closed on a pleasant mountain glade, far above the flaming cities on the plains below. Gates swung where God willed, and man could only submit. Perhaps they opened where they did for a reason, but it was not man's place to question God's reasons.

Hassan Maklouf was their leader, a man who had walked on eighteen worlds and bore in consequence eighteen wounds. To ten of those worlds, he had followed another; to eight, others had followed him. From four, he had escaped with his life. With two, he had fallen in love. On one, he had lost his soul. ■



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SCIENCE FACT

Open Minds, Open Source

Eric S. Raymond

There is a revolution going on in software development today that *Analog* readers should find especially interesting—because that revolution has some roots in the hard-SF tradition, and because it raises some fundamental questions about not just the technological machinery of our computers but the social, economic and political machinery that surrounds software development. Because computers and the Internet are becoming such a vital part of our infrastructure, the way human beings frame answers to those questions may well play a significant part in shaping the future of our civilization.

That revolution is called "open-source development," its showpieces are the Internet and the Linux operating system, it's founded on a re-discovery of the power of decentralized peer networks for verifying solutions to complex problems, and it finally offers us the prospect of routinely achieving decent reliability and mean-time-between-failure (MTBF) rates in software. That is, using open-source techniques we can achieve error rates at least comparable to those in computer hardware engineering, and in important cases (such as the Internet) comparable to the robustness of large-scale civil engineering. Open source gives us these benefits, however, at the cost of effectively dynamiting the standard secrecy-intensive business models for software production, a change with large economic repercussions—including, very probably, the near-term collapse or radical transformation of Microsoft and most of the rest of the current software industry.

This article is a report from the front lines by a long-time *Analog* reader who found himself semi-accidentally cast as one of the revolution's theoreticians. I have written this article partly as personal history because that history shows how the tradition of *Analog*-style hard SF was an important ingredient in the (re)discovery of open source.

The Open Source Idea

The "source" in "open source" refers to what computer scientists call "source code"—the human-readable, human-editable form of a program that computer programers work with. Most computer users only see "object code," the opaque block of bits that the computer actually runs. While it is relatively easy to translate source code into object code (typically using a special kind of program called a "compiler"), it is extremely difficult (in many cases, effectively impossible) to translate object code back into readable source code.

The core idea of open-source development is very simple: open-source programmers have learned that secrecy is the enemy of quality. The most effective way to achieve reliability in software is to publish its source code for active peer review by other programmers and by non-programmer domain experts in the software's application area. This premise implies an inversion of traditional prescriptions for managing software development—a shift from small, vertically organized, rigidly focused groups of developers working on secret code to large, self-selected, diffuse, horizontal, and somewhat chaotic peer communities working on a common base of open source code (as, for example, in the case of the Linux operating system or Apache webserver).

In many other fields, peer review would not be considered a particularly radical idea. Historically, the way we have gotten high reliability of results in engineering and the sciences is by institutionalizing peer review. Physicists don't hide their experimental plans from each other; instead, they skeptically check each others' work. Civil engineers don't build dams or suspension bridges without having the blueprints sanity-checked first by other engineers independent of the original design group.

Early on, however, mainstream software engineering moved in the opposite direction (away from open development and peer review) for two reasons. One was purely economic—companies producing software discovered a business model in which, rather than providing reasonable quality or service, they were able to extract enormous rents simply by using code secrecy to lock in their customers. The other was more technical—software engineers came to believe that large, loosely-managed development groups were a sure recipe for disaster.

For many years, one of the axioms of software engineering was "Brooks's Law," proposed in Fred Brooks's pioneering work on software project management, *The Mythical Man-Month* [MMM]. Brooks observed "Adding more programmers to a late software project makes it later." Software engineers came to believe that a project's vulnerability to bugs and problems scaled with the number of interaction paths between code written by different developers (that is, as the square of the number of developers). This implied that projects with many developers should be expected to collapse under the weight of unplanned and unintended interactions. Reliability, it was thought, could only be achieved by small "surgical teams," executing rigidly pre-defined specifications and isolated from their peers to avoid distractions.

Although Brooks did not advocate code secrecy as such, Brooks's Law seemed to support the practice; if adding more programmers couldn't help and isolating your team from distractions is good practice, then why ever reveal your code? The accepted doctrine of commercial software production came to include code secrecy as well as the surgical-team organization.

Unfortunately for that accepted doctrine, the reliability of the closed-source software it produces remained, on the whole, hideously bad. Even leaving aside subtler failures to get the intended function of a program right, gross errors such as crashes and hangs and lost data remained all too common. Gerald Weinberg observed in 1971 that "If architects built houses the way programmers built programs, the first woodpecker to come along would destroy civilization." In the ensuing thirty years most of the software industry, addicted to its secrecy rents, resolutely avoided even thinking about whether its theory of closed-source development management might be broken; instead, managers took the easy out and blamed the programmers. Software consumers, for their part, were brainwashed and pummeled into a sort of numb acceptance—persuaded that software flakiness was inevitable and they'd just have to pay extortionate prices for the continued privilege of living with it.

In retrospect, the infrastructure of the Internet should probably have taught us better sooner than it did. Almost all of the Internet's core protocols were developed through open-source implementations—and its reliability is extremely good. There have been few enough serious software crashes in the Internet core to count on one hand, and the last one happened in the 1980s. When you have problems with your Internet access, it is invariably a problem with the closed-source software on your PC that happens after the Internet gets the bits to you.

The Internet is a particularly compelling demonstration because it is the largest and most complex single system of cooperating hardware and software in existence. It's multi-platform, heterogeneous, international, and served user populations of widely varying backgrounds through thirty years and many generations of computer hardware and networking technology.

The pattern is simple and compelling. Where we have open-source software, we have peer review and high reliability. Where we don't, reliability suffers terribly. Peer review is a major reason why airplanes crash much less often than programs, even though airplane parts wear out while program bits do not. Aeronautical engineers (like Internet hackers) have learned to use a design process that is top-to-bottom transparent, with all layers of the system's design and implementation open to constant improvement and third-party peer review. Indeed in most parts of the world such transparency is required by law—and where it isn't, insurance companies demand it!

People who actually write code generally warm to the open-source idea very quickly once they understand that they can still have jobs and pay their bills; open-source development is much more productive and fun than the traditional closed-source mode, and you get to have your beautiful source code known and appreciated by your peers instead of being locked up in a vault somewhere. The defense of closed source doesn't come from programmers, but from managers and investors. Our business culture has traditionally considered collecting secrecy rent a wonderful way to garner large profits from a minimum of actual work, and thus has tended to treat the defense of proprietary intellectual property as an absolute imperative. In this view, publishing your organization's source code would be an irresponsible sacrifice of future gains—and, if Brooks's Law is correct, a pointless one.

Why Closed-Source Development Is in Trouble

The problem with the proprietary, closed-source way of doing software is that, increasingly, the brainwashing isn't working anymore. The costs from normal software error rates are exceeding the tolerance of even the most thoroughly acquiescent customers (one visible symptom of this trend is the exponential trend of increase in email Trojan horses and website cracks). Partly this is because the cost per error rises as the customers come to rely more on their software. Partly it's because the bugginess of closed-source software is getting progressively worse in absolute terms of errors per line of code.

To see why this is, consider how the internal complexity and vulnerability to bugs of a program scales as it grows larger. Both measures are driven by the number of possible unanticipated interactions between different portions of the program; thus, they increase roughly as the square of program code volume. But the average code volume of programs is itself increasing geometrically with time (roughly tracking the 18-to-24-month doubling period in hardware capability predicted by Moore's Law); thus the complexity of the debugging task (and the number of skilled programmer-hours required to debug a typical program) is also increasing geometrically at a higher rate—much faster than any one organization can hire programmers.

Thus, traditional development managers within closed-source shops are increasingly finding that they just can't muster enough skilled attention on closed, monolithic programs to get them even minimally debugged. A major index of this problem is the known-bug inventory of Microsoft Windows, which has actually gone up in every release since 1995—in a leaked internal memo, Microsoft admitted to over 63,000 "unresolved issues" in its Windows 2000 release. Over time, closed-source development costs are rocketing for results that get proportionately worse. This is creating economic pressure on development managers to think the previously unthinkable.

In the open-source world, on the other hand, we've found that it's effective to knock down the walls, expose the process, and invite as many volunteers as possible to bring their individual talents to bear on the design, implementation, and debugging tasks. Not only does this bring in many more well-motivated programmers and testers than a closed-source producer can afford to hire, it also turns out to change the behavior of developers in important ways that lower overall error rates (just as the prospect of peer review in other kinds of engineering raises the quality bar for the drawings engineers will let out the door).

The results in software MTBF are dramatic. Returning to our real-world example: Microsoft Windows machines are subject to frequent lockups, generally require rebooting more than once a week, and need periodic re-installation from scratch to eliminate problems such as registry creep and DLL conflicts. Linux systems, on the other hand, are so stable that many only go offline when brought down for hardware fixes and upgrades.

What's going on here is not that Brooks's Law has been repealed, but that given a large peer-reviewer population and cheap communications its effects can be swamped by competing nonlinearities that are not otherwise visible. This resembles the relationship between Newtonian and Einsteinian physics—the older model is still valid at low energies, but if you push energies and velocities high enough you get surprises like nuclear explosions or Linux.

A Brief History of Open Source

But why now? Why didn't these effects become clear ten years ago, or await discovery for another decade? To understand the timing and current impact of open source and some of its larger lessons, it's helpful to know where and how the method evolved. Its history is intertwined with the rise of the Internet.

The practice of open-source development began nearly thirty years before it was named or analyzed. The roots of today's open-source culture go back to the late 1960s and the first steps towards the Internet's predecessor, ARPAnet.

From 1969 to 1983 the open-source culture evolved its practice completely without a theory or ideology. I personally became involved exactly halfway through that period, in 1976, and remember those early days well. We exchanged source code to solve problems. We learned how to manage distributed open-source collaborations over the infant Internet without labeling the practice or reflecting much on what we were doing. We (not I, personally, but the culture I was part of) were the hackers who built the Internet—and, later, the World Wide Web.

Note to all *Analog* authors (and editors): when you refer to a computer criminal or security breaker as a "hacker," you are committing a vulgar error that annoys real hackers no end. Those people are properly called "crackers" and what they do is "cracking"; it involves little skill and less creativity. The most important difference, though, is that hackers build things—crackers break them. For discussion, see my Web document "How To Become A Hacker" [HH].

In 1983, the hacker community was galvanized by Richard M. Stallman's GNU Manifesto. Stallman (even then generally known by his initials as "RMS") was already a guru revered for brilliantly inventive technical work in the late 1970s. RMS's manifesto attacked closed source code on moral grounds; he asserted a right of computer users to access and modify the code they depend upon, declared a crusade against the ownership of software, and proposed a program of building an entire production-quality environment of "free software" modeled on the powerful Unix operating system.

RMS's call to action proved both effective and controversial. His technical reputation and personal charisma were such that during the next decade, thousands of programmers cooperated with his "Free Software Foundation" (FSF) to produce critically needed free-software tools like compilers, programmable editors, file utilities, and Internet communications programs (I was an early and frequent contributor myself). His choice of Unix as a model also proved sound; during the same period Unix became the workhorse operating system of serious computing and the emerging Internet. On the other hand, RMS's general attack on intellectual property and the quasi-Marxist flavor of much of his propaganda turned off many hackers and utterly alienated most software producers and customers outside the hacker culture itself.

By 1990, Internet and Unix hackers really did form a culture in the sense social scientists use that term. We had developed shared values and practices, a common body of folklore and history, a distinctive style of humor, and an elaborated slang described in the well-known Jargon File. This culture (and its sense of in-group identification) had been successfully transmitted between generations. And there were lots of us, scattered like a sort of invisible college or freemasonry throughout universities, research labs, and corporations all over the planet and including many of the best and brightest computer programmers in the world. I had been anthropologically fascinated by this community for fifteen years; when I accepted primary editorial responsibility for the Jargon File around 1991 I became one of the culture's principal historians, a move which was to have unexpectedly large consequences five years later.

The FSF successfully mobilized an astonishing amount of talent, but never fully achieved its goals. Partly this was because RMS's rhetoric was so off-putting to most of the businesspeople who buy software and run software companies. But part of it was a technical failure. By 1991 most of the toolkit for RMS's free-software Unix had been written—but the central and all-important kernel (the part of the operating system that remains resident in computer memory all the time, brokering requests by programs to use the physical hardware) was still missing. In fact, development of the FSF's kernel had stagnated for five years, with no release in sight. Into this gap stepped Linus Torvalds.

Torvalds was a university student in Finland, who, frustrated with the high cost of proprietary Unixes, decided to write his own for his personal computer. But not by himself, no—Torvalds, then in his early twenties and a generation younger than the original Internet cadre, had grown up immersed in the hacker culture and half-instinctively turned the project into the largest Internet collaboration in history. In doing so he intensified the existing practices of the hacker culture to a previously unheard-of level, and produced dramatic results. Linux, by providing a single visible focus for open-source development, assimilated to itself the development efforts and momentum of almost the entire hacker culture, perhaps as many as 750,000 developers worldwide. Within two years, by late 1993, Linux became seriously competitive with proprietary Unix operating systems and Microsoft Windows—and, having been developed by the natives of the Internet, actually made a better Internet platform than any of its competitors.

The Author as Accidental Revolutionary

That's when I got involved with Linux. I'd been a happy Unix hacker and FSF contributor since 1982. Since 1990, as maintainer of the Jargon File, I had fallen into the role of the hacker tribe's own observer-participant anthropologist. When the earliest packaged versions of Linux obtruded on my consciousness it was partly because they shipped with quite a few lines of code I had written myself. And Linux presented me with a disturbing puzzle.

Like many hackers, I had gradually and unconsciously learned how to do open-source development over a period of years—without ever confronting how completely its practices contradicted the conventional Brooksian wisdom about how software should be done. I had learned open-source instincts, but had no theory to explain why they led to effective behavior. Linux, by presenting an entire world-class operating system built from the ground up by a huge disconnected mob of semi-amateur volunteers, finally forced me to face the problem. I realized that if Brooks's Law were the whole story, Linux should be impossible.

After three years of coding and thinking and research, in 1996, I wrote a paper called "The Cathedral and the Bazaar" [CatB] in which I suggested that distributed peer review was the secret of Linux's success, and proposed what I called "Linus's Law": given a sufficiently large number of eyeballs, all bugs are shallow. In that paper I began a detailed analysis of the social mechanisms that support open-source development in the hacker community. In its sequels, "Homesteading the Noosphere" and "The Magic Cauldron," I extended that analysis, and even proposed business models that would support sustained profits from software development without relying on code secrecy. (The basic insight there is that in order to live without secrecy rents, we need to reconstruct software production as a genuine service industry like medicine or automotive repair.)

"The Cathedral and the Bazaar" was written as anthropology, but (rather to my astonishment) the hacker community quickly adopted it as a manifesto. As Robert Heinlein famously observed, "it steam engines when it's steam-engine time," and following the mainstreaming of the Internet in 1993-1994 the time was ripe. I now believe some close equivalent of the analysis in this paper and its sequels would inevitably have been uttered sometime between 1994 and 2000 by someone else, even had I pursued my original vocation as a foundational mathematician. All it took was some ability to disregard preconceptions long enough to see the logically obvious—a skill I was trained in by reading SF. There is probably a near timeline, dear reader, on which I am reading this article as written by you!

In our timeline, this work supplied the missing theory to explain existing open-source practice. Unlike RMS's free-software crusade, it offered a justification that people could evaluate and accept without having to change their position on whether intellectual property was a good or an evil. This energized the community like nothing had since the GNU manifesto—and, unlike the GNU manifesto, it was an argument understandable to businesspeople and others outside the hacker community. The effect was to boost open-source hackers and their allies from feeling like marginalized subversives into being armed and motivated revolutionaries, ready to break out of their ghetto and take on the world.

The shot heard around the world in this particular revolution was the source-code release of the 'Mozilla' web browser at midnight of April Fool's Day, 1998. Linux had begun to show geometric growth in market share two years earlier, but only a handful of people in the computer trade press noticed the early going. It was Netscape's unprecedented decision to open the code for a key part of its product line that made Wall Street sit up and take notice. And, incidentally, changed my life—because Netscape's top executives pointed at my work to explain their move.

Since then, open-source development has posed a serious public challenge to the established software industry. The industry's leading edge, electronic-commerce and Internet services companies, has generally embraced the method—as has IBM, the once and perhaps future king of the industry. Other major technology companies such as Sun Microsystems, Intel, Hewlett-Packard, Cisco, and SGI have discovered strategic advantages in backing open-source projects. Linux- and open-source-centered new firms like Red Hat Software have run spectacularly successful IPOs, survived the bursting of the dot.com bubble in early 2001, and are now demonstrating the revenue potential from using open-source development to create product and services businesses.

Adoption trends have been even more dramatic outside the U.S. than within it. We can afford the high costs of closed source, even as we grumble about them; Europeans are less wealthy, and in the Third World pressure to find cheaper alternatives is intense. Increasingly, open source fills those needs. Appropriately enough, the only place it has not succeeded at winning hearts and minds is where it was imposed by government fiat—in communist China the government attempted to mandate a massive nationwide switchover from Windows to "Red Flag Linux" and failed.

Perhaps the ultimate endorsement came when Microsoft tried to use Linux as an antitrust defense. At trial in 1999, Microsoft's attorneys talked up the wonders of Linux in an effort to convince the judge that vigorous competition still existed in the desktop operating systems market. The judge, considering Microsoft's 91% market share there, was unconvinced. But by the Fall of 2000, Linux had passed Windows in market share on Web and Internet server machines, had taken over embedded computing—and looked set to crack Microsoft's monopoly on the desktop, a development that is gathering steam now (though, as of this writing in 2003, still primarily outside the U.S.).

Links To The SF Tradition

And those connections to the SF tradition? The culture of open-source hackers is deeply pervaded by imagery and attitudes derived from SF. I documented this influence a decade ago in the expanded print version of the Jargon File, *The New Hacker's Dictionary* [NHD]; it shows very clearly in hacker slang, which is replete with SF references.

While the obvious influences from the cyberpunks of the 1980s are present, the Campbellian hard SF of writers like Larry Niven, Vernor Vinge, and Greg Bear has had a more lasting and important influence. Terry Pratchett, author of the Discworld novels enjoyed by many SF fans with a low opinion of the generic fantasy they satirize, is also enormously popular among hackers. I single out these four writers in particular because, unlike the cyberpunks, they have frequently been invited speakers at hacker-run conferences.

The worlds of SF and the hacker community blend perhaps most seamlessly in Neal Stephenson, a writer and programmer whose acclaimed fiction (*Snow Crash*, *The Diamond Age*, *Cryptonomicon*) is complemented by "In the Beginning Was The Command Line" [CL]. This wide-ranging nonfiction essay on the psychology of computer interfaces was inspired by Stephenson's observations of the Linux community, and is in significant part a meditation on open source.

More personally, SF taught me to think of people and cultures as adaptive machines. SF also taught me that the universe doesn't respect the neat little compartments human beings like to chop their knowledge into. Robert Heinlein, in particular, showed me the value of the encyclopedic-synthesist stance. The cross-disciplinary analysis I did in "The Cathedral and the Bazaar" and its sequels was the result of a direct, intentional, and conscious execution of Lazarus Long's advice that "Specialization is for insects." It is understood in that way by many of my peers in the hacker culture.

Lessons For The Larger World

How can giving up on central control, pre-planning and the vertical command organization of software development produce better results? The answer is implicit in the way that cost nonlinearities associated with scaling change the tradeoffs of complex systems.

Ask any architect. Have you ever wondered what the practical limit on the height of skyscrapers is? Turns out it's not strength of materials, nor our ability to design very tall structures that are stable under load. It's elevators!

For a skyscraper to be useful, people have to be able to get in and out of it at least twice a day (four times if they eat lunch). The number of elevators a building needs to get people in and out of it rises with the number of people in it, which is roughly proportional to its floor space, which is roughly proportional to the square of the height. Thus, as buildings get taller a larger and larger percentage of the building core has to become elevators. At some critical height, so much of the building has to be elevators that the activity on the remaining floor space can't pay for any more of them. The communications overhead implied by the system's single choke point (the ground floor) crowds out production. Instead of building a taller vertical skyscraper, you need several shorter buildings connected by a subway.

Or ask any economist. Today's slow-motion collapse of closed-source software development mirrors the collapse of central economic planning two decades ago, and proceeds from the same underlying problems. Command systems are poor at dealing with complexity and ambiguity; as complexity rises, it inevitably outstrips the coping capacity of planners. As planning deteriorates, accelerating malinvestment pulls down the whole system. In economics, this is the end-stage of collectivism correctly predicted by economist F.A. Hayek in the 1930s, fifty years before it was acted out in the Soviet Union. In software development, we observe a similar tendency of planned systems to complexify until they collapse of their own weight.

Ecologists, too, have learned to respect the kind of decentralized self-organization that occurs at every level of living systems. The tremendous interwoven complexity of an ecology isn't designed—it doesn't happen because any central organizer planned a preconceived set of interactions between the different species that make it up. We know this because those interactions aren't even stable over historical let alone evolutionary time—climate fluctuations, predator-prey cycles, and sporadic events such as major fires or disease epidemics can and do change the rules at any time. Nevertheless, ecologies develop and sustain extremely rich interactions from the unscripted behavior of the selfish adaptive machines that compose them.

Ecologies, market economies and open-source development all have crucial patterns in common; they are all examples of what computer scientist John Holland has called a "Complex Adaptive System" (CAS). CASs are composed of selfish adaptive agents which have only limited, local information about the state of the system. Their complexity arises not from global planning but as an unintended result of each agent's search for better, more competitive adaptive strategies. Global equilibrium and order at each level of a CAS emerges as what systems theorists call an "epiphenomenon"—organization that is not predictable from knowing only the rules of the next lower level. The information that sustains that organization is distributed and largely implicit in the evolved structure of the CAS itself, not explicit and centralized in the knowledge of any one agent.

The distributed intelligence of CASs, in fact, is precisely why they exhibit higher complexity, and cope with complexity, far more capably than can planned centralized systems. Distribution means there is no critical node, no single point of failure to be overwhelmed as the system scales up. Because the agents in such systems are constantly varying their adaptive behaviors in search of an edge on the competition, unpredictable stresses are far less likely to disrupt the CAS as a whole than they would be to blindside a planned system with planners looking in the wrong direction.

The flip side of this is simple, and it's the same lesson we learn from the elevator effect: centralization doesn't scale. Even if the environment of a growing technological or social or ecological system is miraculously simple and stable, the escalating internal complexity and communication costs of the system itself will eventually boost it into a regime where centralization fails.

In the end, nothing less will do for dealing with environments of high complexity than the distributed implicit knowledge and self-organizing chaos of markets, of ecologies—or of open-source development.

The history of the open-source revolution also reminds us that technological change does not happen in isolation. New technologies and innovations can go unrecognized and under-utilized for years if the social machinery to exploit them doesn't exist. Business models are important too. I've spent a lot more words that sound like business reporting in this article than you'll see in a typical *Analog* fact piece, and that was on purpose—the lesson is that open-source development couldn't be practiced at a level significant to the general economy until somebody figured out how to explain its effects in market terms and other people figured out how to turn those efficiency gains into profits.

The subtler lesson is that the full use of a new technology may demand new narratives, new ways of seeing the world—and the technology itself doesn't automatically generate the narrative to go with it. Without the right enabling theory or generative myth to organize peoples' perceptions of otherwise isolated facts, even the most powerful set of innovations may languish in the margins of the economy for a long time. The Mayans had the wheel, but only used it for children's toys; they did real cargo hauling with drag sledges.

Hackers did open-source development as a folk practice for fifteen years before RMS tried to create a new way of seeing the world around it. The wrong explanatory myth (as in, arguably, RMS's moral crusade against intellectual property) may actually retard acceptance.

Therefore, finding the right narrative to help people understand a technology can actually be a critical factor in promoting it and shaping the future. John Campbell knew this when he encouraged the SF writers of the '40s, '50s and '60s to celebrate the exploration of space. I, a frustrated would-be SF author and aspiring Heinleinian generalist, rediscovered it rather by accident when I wrote a simple little anthropology paper that rocked the software industry to its foundations. I have no doubt there are other technologies out there waiting for their moment, waiting for the imaginative spark that the SF tradition can provide to liberate their full potential.

Truly it has been written that the best way to predict the future is to invent it. As science-fiction readers and writers, and especially as the proud upholders of the *Astounding/Analog* tradition of hard SF, it's our job to create the generative myths of tomorrow. ■

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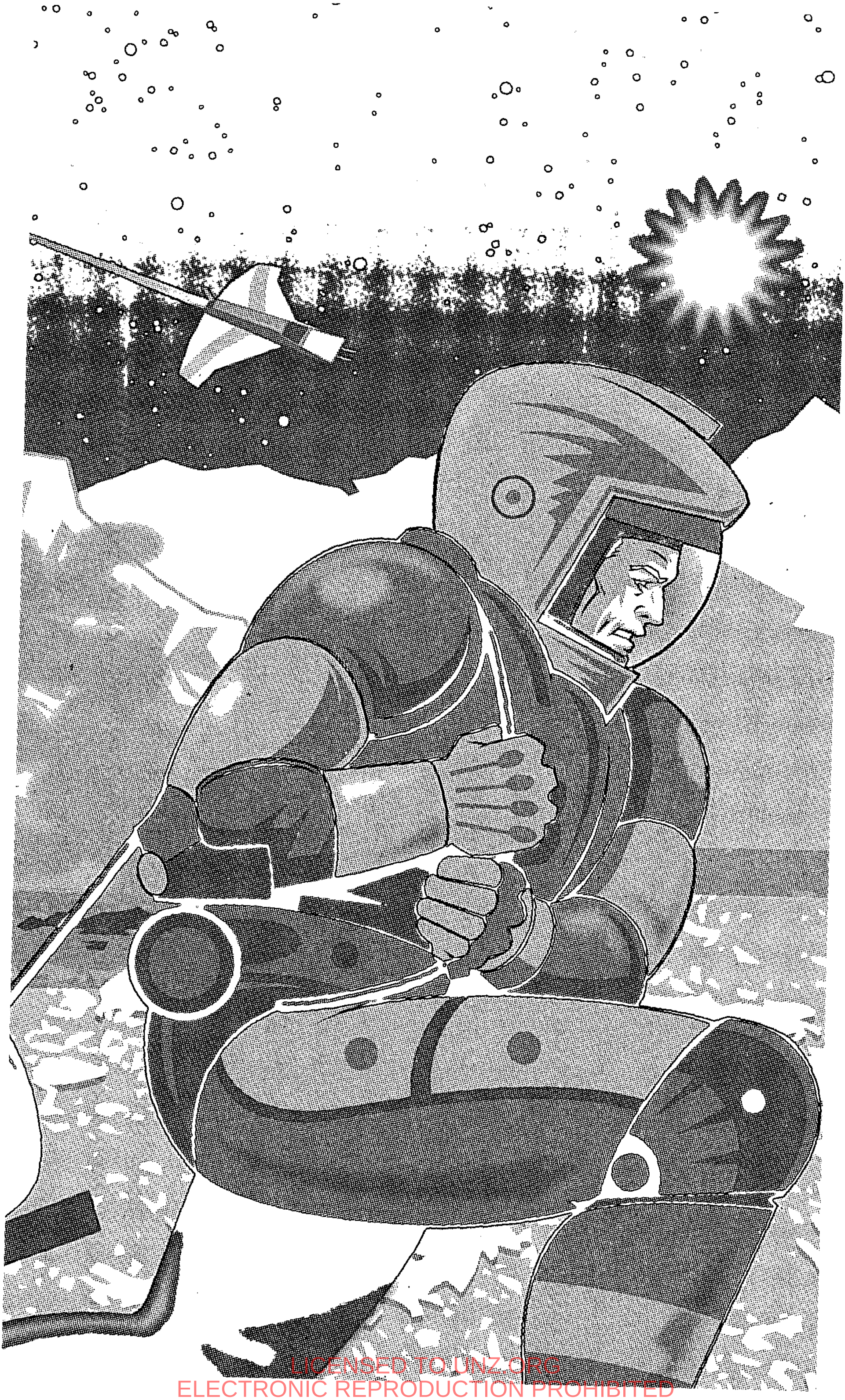
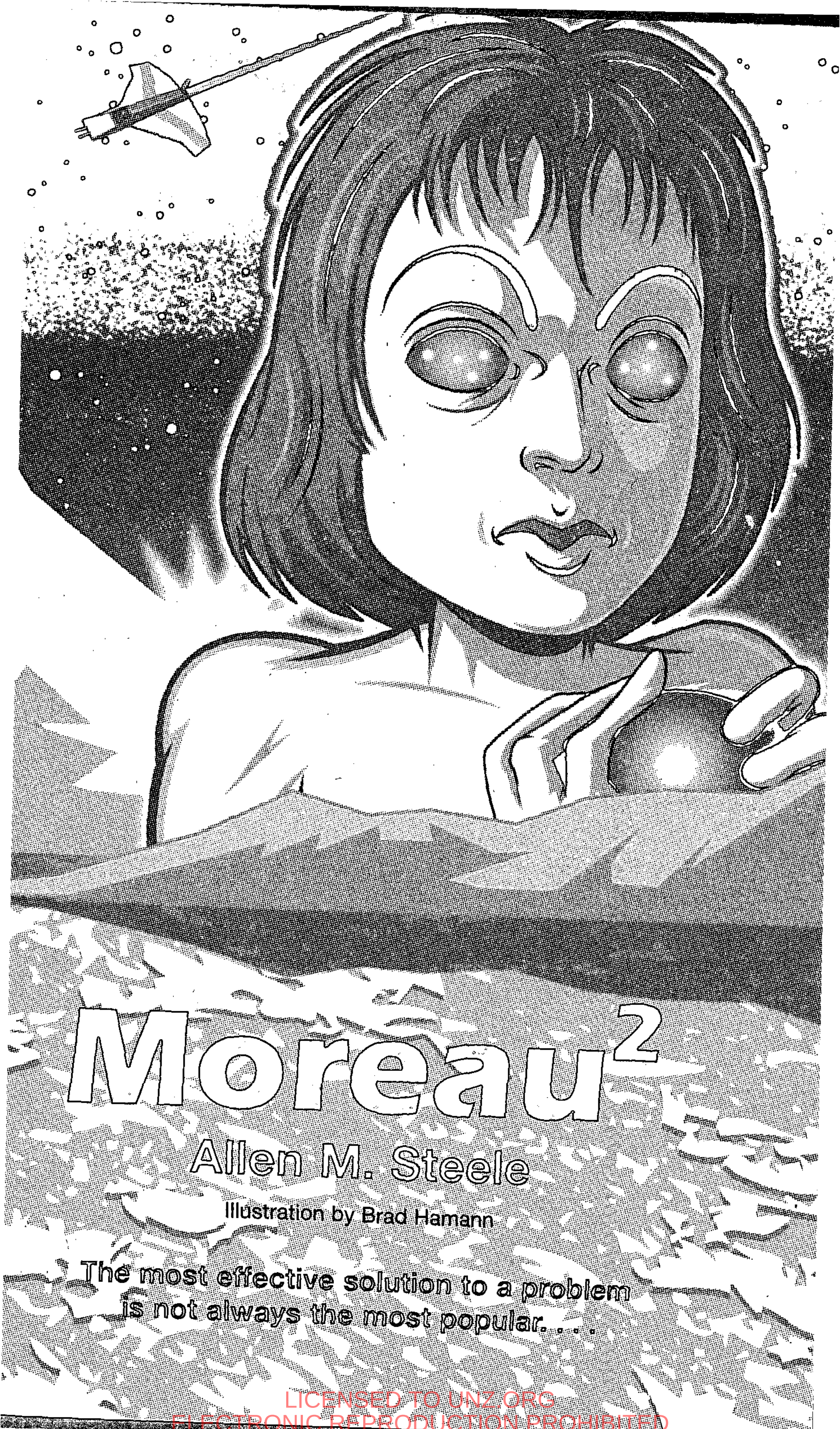
> If you can't imagine a better world, you can't change this one.
>
> —Tad Williams





Moreau^2

Allen M. Steele

Illustration by Brad Hamann

The most effective solution to a problem is not always the most popular. . . .

Carson and Mariano were the sole survivors of the crash; everyone else was killed. Upon later reflection, Phil would realize that the only reason why he and George made it through was that they had been in the back of the spacecraft; the military lander had come down nose-first, so the pilot and co-pilot died instantly, and the two Marines from the 4th Space riding in the forward section of the passenger compartment were crushed when the cockpit bulkhead collapsed upon them.

So it was all a matter of luck, really. If the seating arrangements been reversed before they departed Olympus Station, if the Pax Astra heatseeker the pilots were trying to avoid before they lost control had made a direct hit, if the craft had rolled over upon impact, if its fuel tanks had exploded . . . no sense in trying to second-guess fate. They were alive, and that's all there was to it.

But Mariano was unconscious, and when Carson pulled him from the wreckage he noticed that his right leg was twisted at a bad angle. Phil didn't know enough first-aid to help him even if he wasn't wearing a moonsuit; at least his suit was still intact, and when Phil pushed back George's helmet visor, he saw a white smudge of vapor against the faceplate. That's when he knew for certain the photographer was still among the living.

Burying the dead was pointless. The pilots were entombed within the craft, and he would have wasted precious air attempting to dig graves for the two Marines in the lunar regolith. When Phil climbed back into the lander to see if he could salvage anything useful, he found a helmet resting a couple meters away from the moonsuit to which it had once been attached. It took a few moments for him to realize that the helmet wasn't a spare, and the significance of the red ice frozen around the suit's collar ring. He turned away and took several deep breaths, and somehow managed not to get sick.

Some reporter he was: he couldn't remember the names of the soldiers who'd died.

Pulling a seat cushion out of the ship, Phil lashed George to it with a safety belt, then found some severed electrical cables and used them to fashion a crude harness. He also found an undamaged carbine, but decided against taking it; if he was picked up by a Pax squad, carrying a weapon might invalidate his status as a non-com. He located Mariano's camera bag, and as an afterthought he looped its strap around the photographer's neck. If he knew George, he'd throw a fit if he woke up to find that his rig had been left behind.

The electronic compass on his helmet's heads-up told him which direction was west. He pulled up a map overlay, and discovered that the dead volcano upon the horizon was Sosigenes. He had no idea how far away it was; he'd already been warned that ground distance was difficult to determine on the Moon. With any more luck, they might be able to reach it before their air ran out. And, after all, Sosigenes had been their destination in the first place . . .

So off he went across the Sea of Tranquility, trying to avoid the larger rocks in his way as he dragged Mariano behind him. One-sixth gravity helped a little bit, but not much; the stretcher prohibited him from making bunny-hops, and after awhile it didn't seem as if there was any real difference. At first he maintained radio silence, for fear that any transmissions might bring another missile down upon him, until he realized that the radio was his only real hope of being rescued before his air supply was used up. So he switched it back on and toggled to the emergency band. No one responded to his calls for help, though, and soon he was singing "Little Red Rooster" over and over, just to keep him himself company. It was the only song he could remember offhand, but his father had sung it with his platoon during Gulf War II, and just now it seemed appropriate.

About an hour after he left the crash site, Phil caught a faint flicker from the corner of his eye. He turned to look, and saw a bright starburst above the southern horizon. A moment later, he spotted another one, like distant fireworks on the Fourth of July. Then he glimpsed tiny pinpricks of light racing across the sky, low to the ground in the approximate direction of Arago Crater, and realized what he was witnessing: a battle between the Pax Astra Free Militia and the 4th Space Infantry.

Too bad he didn't know how to operate George's camera. It would have made an excellent shot to accompany his dispatch from the front. If he lived to write it, that is.

Phil was within sight of the long, deep rill separating him from Sosigenes, and was beginning to wonder how he was going to get around it (and trying to forget the fact that he had less than fifteen minutes of oxygen left; he hadn't checked Mariano's suit lately, so he had no idea whether his companion was alive or not) when he saw something moving several kilometers away. At first he thought it was a sunlight reflecting off the silver-gray dust that marred his visor, but as he watched it became a white object, kicking up fantails of regolith as it skirted boulders and small impact craters.

A rover.

Dropping the stretcher, Phil began jumping up and down as high as he could, waving both hands above his head. That wasn't a good idea; besides the fact that he used up more air that way, he was also exhausted. As the rover swerved toward him, the sole of his left boot came down on a rock; Phil lost his balance tumbled to the ground.

The back of his head smacked the inside of his helmet, and that was the last thing he felt for a good long while.

Like so many conflicts before it, the Moon War began with a press conference.

The OTV from the Cape carrying the twenty members of press pool arrived at Olympus Station at 1100 hours. Phil was already there, of course; as a UMI stringer, he had living aboard Skycan for the past four months, filing stories about the breakdown of diplomatic relations between the Pax Astra and the spacefaring Earth nations. Fat lot of good it had done him; as soon as the U.N. Security Council voted in favor of the U.S.-backed resolution authorizing military action against the Pax, orders came down from the Civil Space Administration to quarantine the operations center in the station's hub.

Joni Lowenstein, Skycan's general manager, had been apologetic about the whole thing. "Nothing personal, Phil," she'd said during their brief discussion after he'd discovered he was no longer welcome in MainOps. "It's just that CSA . . ." she pronounced it as *see-saw* ". . . doesn't want any leaks. Don't worry, you'll get the details when your buddies show up."

The clampdown blew away any chance of him scooping the competition. The only people who knew exactly what was going on were sequestered from the rest of the station, and when Phil tried logging into Olympus's computer from his bunk terminal, he found that the back door he had secretly installed eight weeks ago had been deleted. Joni probably knew about it all along.

So he filed a brief dispatch describing the news blackout, a story which someone allowed to be sent because it contained nothing really new, and a half-hour later a desk editor at UMI's Washington bureau replied with a terse message: *Story thin. Try harder. Understand situation, but you've got the ball. Mariano arriving soon: hook up with him.*

So he monitored the net, which told him little that he didn't already know—the Pax Astra embargo against shipments of He^3 in retaliation against the U.N.'s refusal to formally recognize the Pax as an independent nation, followed by the shoot-down of an American lunar spysat, which in turn lead to an emergency meeting of the Security Council and the subsequent declaration of hostilities—and impatiently waited until, eighteen hours later, twenty journalists who'd won the straw-pull to represent the hundreds of reporters, photographers, cameramen and talking heads left behind came climbing or falling down the ladder into Module 39, one of the station's two rec rooms.

Phil watched their arrival with quiet amusement. His buddies. Right. There were perhaps a two dozen reporters working the space beat these days, but most were posted either in Descartes City or in Clarke County, the big Lagrange colony. Of all the major net services, UMI alone had decided to put someone on Olympus. The station had once belonged to Skycorp, but when the powersat construction program had ended, the company had sold the station to a Japanese consortium, and when Uchu-Hiko failed to make it work as an orbital hotel, they had passed it off to CSA; the station was too big to deorbit, but too expensive to properly maintain, and so now it was just a ring-shaped hulk wasting away in geosynchronous orbit. His colleagues thought he was nuts for taking this backwater assignment; the real action was clearly further out in system, with the Mars colonies being the assignment everyone wanted. But Mars was claiming neutrality, and now the Pax was deporting correspondents from Descartes and Clarke County while censoring dispatches from the small handful allowed to remain.

So UMI had something of jump on the competition. With the rest of the space press sent packing, the only reporters able to cover the story were groundsiders hastily mustered from bureaus in Washington, London, and Rio. Not only was UMI's man already on the scene, but he was also long-since acclimated to Olympus. And even though he was out of the loop, at least Phil had the pleasure of watching his "buddies" come aboard.

If the thunder and shudder of the shuttle launch, or the long ride to GEO aboard an orbital transfer vehicle, hadn't been enough already to blow their professional cool, the gentlemen of the press were thoroughly rattled by Skycan's one-third gravity. Some looked distinctly green, while others experienced the wonders of Coriolis effect for the first time; Phil watched as a woman absently dropped her datapad on the nearest table, then gape in surprise as it missed the table completely and fell to the carpeted floor below.

One of the last people to clamber down the ladder was a squat, thick-set guy with a heavy gray beard, wearing a photographer's vest over a New York Dodgers sweatshirt. A little less ruffled than the rest of the pack, he was still noticeably pale, the sparse hair on the crown of his skull slick with sweat. Phil had to stare at him for a minute before he was sure who he was.

"George!" He whistled and raised a hand. "Hey! Mariano!"

The photo glanced around, spotted him, trudged over to where Carson was seated. "Phil Carson," he said, dropping his camera bag in an empty chair. "How the hell are you?"

"Better than you, I think."

"No kidding." George picked up his bag again, sat down. "What am I doing here?"

"Covering another war. Didn't they tell you?"

"Oh, yeah. Right." George grimaced. "Swear to God, I had to fight my way onto this junket. Arm-twisting, extortion, major bribes . . . and what happens soon as we reach orbit?"

"You threw up."

"Threw up, threw down, threw out . . ." He pulled a bandana out of a vest pocket, swabbed his forehead. "Turned fifty last week. Haven't been up in nearly six years. Man, I'm too old for this shit."

Phil grinned. When he met Mariano shortly after he started working for UMI, George had already been an old space hand, covering stories both on Olympus and the Moon. Mariano had shown him the ropes, then asked for reassignment to the Florida bureau. Now here he was, a few kilos heavier and a few less hairs on his head, called back into the saddle one last time . . .

"Jeez, it's nice to see you again."

"Yeah, yeah." George glared at him. "Knock it off. I hear you're having trouble."

"Max Q. News blackout as soon as the story broke."

"Pentagon?"

"I'm told it's CSA who set the rules."

"They don't call the shots in something like this. At least not directly."

"Well, whoever it is, they're not saying word one. Not until the briefing, at any rate."

"Screw the briefing. I want meat." George unsnapped the top of his bag, found a tiny valve, and gave it a twist. An airtight membrane deflated with a soft hiss and the bag sagged slightly, then he unzipped the inner cell. "Get me to where the action is, that's all I want. When do we ship out?"

Phil shrugged. "Your guess is as good as mine. The military hasn't arrived yet, so my guess is that the GM will handle the briefing."

"Lenny Baskin?"

"Uh-uh. He got replaced a long time ago. The new boss is Lowenstein. Joni . . ."

"I know Joni. Nice lady. Have you heard anything?"

"Nada. You?"

"A little." Mariano pulled out a Nikon, fitted a 50mm lens onto its body, unwrapped a disk and slid it home. "4th Space mobilizing at the Cape, 2nd Space on Matagorda Island. Nothing confirmed, of course, but we've got reports that they're about to launch, if they haven't already. My guess is that they'll go for a . . ."

"Here comes Joni now."

The GM descended the ladder. An old Skycorp vet, Joni Lowenstein was in her mid-sixties, but only her butch-cut gray hair and the crows-feet around her eyes revealed her years; otherwise, she could have been a woman half her age. Conversation died off as she strode to the end of the compartment room and sharply clapped her hands. "If I can have your attention, please," she called out, "we'll begin the briefing."

Cameras whirred and clicked, reporters switched on datapads. A TV crew jostled their way to the front of the room and hastily set up their equipment. Joni obviously didn't want to be here; she shuffled her feet, looked like she wanted to disappear, yet she patiently waited for everyone to find their places before opening her pad and reading aloud a formal press statement.

Most of the facts were already known. At 1800 hours GMT, Tuesday, January 16, 2052, a surveillance satellite placed in low orbit above the Moon by the United States was destroyed by a missile launched from Descartes City in the lunar highlands. This was followed by a communiqué from the Pax Astra stating that the spysat constituted unlawful infringement of its territory. Since the U.N. hadn't recognized the Pax Astra as a sovereign nation, the Security Council had invoked the 1967 Space Treaty and unanimously approved the American resolution proposed that the embargo and shootdown constituted an act of aggression against the signatory nations.

"So the situation is as follows. The United States, under U.N. authorization, has decided to reclaim Descartes City." Joni checked her notes again. "Five hours ago, one hundred troops from the 4th Space Infantry, U.S. Marines, were mobilized from the Kennedy Space Center, with forty more troops from the 2nd Space on standby at the ConSpace launch site on Matagorda Island. The assault will be staged from here, Olympus Station, where the forces will be loaded aboard lunar landing vehicles provided by various American and Japanese corporations, with logistical support from the European Union. The LLVs are scheduled to depart GEO within a launch window which is still classified. The objective is a frontal assault against Descartes City within a time-frame that is also classified at this time."

Joni lowered her pad. "I'll take questions now," he said. "Please identify yourself and the news organization you're representing."

There was the usual coughing and shifting through scribbled notes before the first reporter stood up. "Dale Hale, *Time-Global*. It hasn't been adequately explained why the Pax Astra would shoot down a U.S. spysat. Have they yet explained their reasons for doing so?"

"The Pax government stated that the satellite was an incursion of the . . . um, airspace, for lack of better term . . . above Descartes. They stated that the sat was put there with the sole intent of monitoring their movements in preparation for a military attack. The Pentagon has categorically denied this. Next question."

Fingers gently tapped keypads. The compartment grew warm under the glare of camera lights. Joni swabbed sweat from her forehead; she seemed too aware that, even as she spoke, her image was being transmitted in real-time to hundreds of thousands of websites. The handful of reporters gathered here were little more than data-collectors and question-askers, acolytes of the church of information. With only the most insignificant of delays caused by satellite downlink and AI-augmented language translation, her words were being disseminated to billions of terminals scattered across the world below. For a few brief minutes, she'd become the most visible person on Earth. Phil felt sorry for her. He liked Joni, yet even if he didn't, no one should have to endure this sort of exposure except a trained PR person. Most of them were professional liars; Joni wasn't.

"Ellie Horowitz, San Francisco *Chronicle-Examiner*. Why is the U.S. task force concentrating on Descartes when the Pax Astra government is based in Clarke County?"

"I don't know the reasons and . . . um, I'm not in the position to speculate."

"Does this have anything to do with the fact that Clarke County is reported to be in possession of a nuclear weapon?"

"I'm sorry, but I can't comment on that. Next question, please."

Mariano leaned over. "Geez, lady, do a little research, why don'cha?"

Phil nodded. A direct assault on Clarke County was out of the question; all the colony had to do was close its airlocks and docking bays, and it was virtually invulnerable, unless the U.S. was willing to kill ten thousand civilians by blowing the windows of its habitat sphere. Besides, the colony had a ten-megaton nuclear warhead it had salvaged during the revolution from a low-orbit satellite intended to deflect the Icarus asteroid several years earlier. The Pax only had to lob its nuke at any approaching spacecraft, and the 4th Space was toast. Descartes City was far more vulnerable. Clarke County's lifeline was lunar oxygen and water; if Marines seized Descartes, then the Lagrange colony would have little choice but to surrender.

"Bet they're going use Tranquillitatis as the LZ," Phil murmured, and George nodded. No argument there. Mare Tranquillitatis lay just west of the highlands: a vast, flat plain, perfect for a large-scale troop deployment. But, of course, the Pax would know this . . .

The press briefing lurched on. Skycan would be used as the command-and-control center for the invasion—now officially called Operation Lunar Freedom—until a beachhead was successfully established on the Moon. Beyond that, nothing new was disclosed. Joni answered questions one of two ways: *no comment*, or *we can neither confirm nor deny this information*. Phil impatiently waited for someone else to ask the most obvious question. When no one did, he finally raised his hand. Joni seemed reluctant to acknowledge him, but she pointed his way

"Phil Carson, United Media," he said, rising from his chair. "When will the press be allowed to visit the landing site?"

Joni looked as if she'd like to toss him out the nearest airlock. "Under the current conditions, there are no plans to let the press accompany the strike force. We can't allow . . ."

Everyone in the room groaned. "We can't allow civilians to place their lives in jeopardy," she continued, raising her voice. "All members of the press will remain aboard Olympus, where it will observe the operation from the closest safe-distance possible. We'll accommodate any reasonable request . . ."

"So far you're doing a hell of job!" someone shouted from the back of the room.

"Why don't you let us decide whether we're capable of taking that risk?" someone else asked.

"Ladies, gentlemen, please . . ." Joni raised a hand. "I realize that many of you are accustomed to covering wars, but you've got to understand that this isn't South America or the Middle East. This is the Moon we're talking about here, as hostile an environment as you're going to find. You're simply not trained for this, and we don't have the time to teach you how to wear moonsuits or handle an emergency like a blowout."

Low murmurs. She had a point; they were all groundsiders; for many this was their first trip into space. "Then send me," Phil said. He felt Mariano nudge the back of his leg. "George, too," he added. "Both of us are EVA certified. We've moonwalked before."

"Will you work under pool rules?" This from Horowitz of the *Chronicle-Examiner*.

Phil glanced at George. The photographer shrugged. "Sure," Phil said. "We'll share any interviews or photos we get to the rest of the pool." He looked back at Joni. "That way you only have to send down two guys, but everyone up here gets a piece of the action."

"Fair enough," said Hale from Time-Global, and the rest of the poll murmured their assent. "How 'bout it, Ms. Lowenstein?"

Joni shook her head. "Sorry, folks, but the military's pretty clear about this. Absolutely no one goes out who isn't combat personnel or support crew."

"Ah, c'mon!"

"It's not my call. You want to fight this, take it up with the Pentagon PAO when he gets here." She closed her pad. "That's all for now. Next briefing will be here at 0800 tomorrow. This compartment is now designated the newsroom, and Modules 36, 37, and 38 have been set aside as your quarters. You may link your pads with the terminals here or in the bunkhouses, and the com officer will transmit your reports when sat time is available. All meals will be served in the mess deck, modules 25 through 28. All other areas of the areas of the station are open to you except the data processing center and MainOps. I should warn you that, if you attempt to visit these areas without authorization, your credentials will be voided and you'll be sent groundside on the next available OTV. Do you have any questions about these policies?"

Some rumbles, a few obscene comments, but no arguments. Nor was Phil surprised. No one was going to buck the system. Getting shipped home during a breaking story was worse than humiliating; reporters have been fired for less. One of the eternal problems of war correspondence is that the military draws the line wherever it damn well pleases, and there's little anyone can do about it.

"Nice try," George said when the briefing was over. "I could have told you she wouldn't go for it."

Joni had climbed back up the ladder, dogged by a couple of die-hards desperately trying to catch any crumbs of information she might drop. Others hastily typed up their dispatches; lines were already forming in front of the terminals scattered around the room. The TV crew was breaking down their equipment. Someone complained about not being able to smoke.

"Maybe we can get the PAO to change his mind." Phil wearily took his seat again. "If we talk to him when he gets here . . ."

"Ever dealt with a Pentagon public affairs officer?" George asked, and Phil shook his head. "Don't count on it." Then he dropped his voice. "Look, I've got some connections. I'll fire off a squib, see if I can shake something loose. Are you going to be around?"

As if he was going to skip out to the nearest deli for a Reuben and a beer. "Naw. I think I'll head down to my bunk. Send a memo to New York, catch a few winks. I've been up for the last twenty hours straight."

"Okay. If I learn anything, I'll find you."

"Module 38, bunk 6." He stood up. "I've got a private link. Carson-386. Got it?"

"Uh-huh. Get some sleep, kid. It's going to be a long war."

He had been in bed only four hours when his node buzzed. Rolling over in his curtained bunk, he fumbled for the wall terminal. "Carson."

"Phil, it's Joni." No image on the tiny flatscreen, just her voice.

He pushed back the blanket, sat up as much as he could without banging his head on the ceiling. "What's up?"

"Can you come up to MainOps? I want to talk to you about something."

"Sure. Be there in five."

"Okay. The guy at the hatch knows you're coming. And Phil . . . ? This is on the Q.T."

Five minutes later, he was floating weightless in the core shaft of Olympus's hub module, clinging to a handrail and waiting for the command center hatch to open. Ten meters below his feet, he could see the airlock module. An orbital transfer vehicle had docked a few minutes earlier, just as he was coasting through the access tunnel from the rim modules; a couple of Skycorp crewmen were helping several men in cammies crawl through the hatch, and he had passed two military officers while climbing up the ladder from the rim. The Marines had landed.

The hatch opened and a soldier with sergeant's chevrons on the shoulders of his jumpsuit peered at him. There was a taser holstered to his belt, and he looked mean enough to chew nails and pissed off that he had none.

"Phil Carson, United Media."

Without a word, the Marine moved out of his way, and pushed the hatch shut behind him. MainOps was a long cylindrical compartment designed without deference to gravity: duty stations above one another, with chairs fixed on either side of open-grid decks so that one crewman's head was often upside-down next to another's shoulders. The command center was dimly-lit by flatscreens and recessed fluorescent tubes; the only sounds were the electronic chitter of computers, and the soft voices of men and women strapped into chairs before workstations.

"Carson. Up here."

Phil looked up, spotted Joni seated in her alcove. Someone was with her, but he couldn't tell who it was. "Coming up," he replied, then he grabbed the fireman's pole running through the center of the compartment and pulled himself along it. It wasn't until he reached her station that he saw who else was there.

"What took you so long?" Mariano asked.

"Rush hour." He was mildly surprised to see George. "What, there's a shortcut I don't know about?"

"I was shooting the soldiers coming aboard when I got the call." He gently pushed aside the camera dangling loosely on its strap; Phil noticed the lens was capped. "Nice to be here," he said to Joni, "but I wish you'd relax the rules a bit."

Joni shook her head. No apology offered, no explanation required. No one wanted to risk a net photo of MainOps being enhanced and studied by the opposition. "You'll get all the pictures you want," she said. "If you cooperate, of course."

"What sort of cooperation are you talking about?" Phil asked.

"Just a moment." Joni cupped a hand around her headset mike, murmured something. "We'll have company in a second," she said. "Make yourselves comfortable."

Phil found an unoccupied foot restraint, slipped his feet within its stirrups. A few meters away was the traffic control station; peering over the shoulder of the duty officer, he noticed a half-dozen or more blips moving slowly around the three radial bars of the radar screen. Military OTVs, no doubt, holding orbit around Olympus while men and materiel were transferred aboard the station. Operation Lunar Freedom was shifting into high gear.

Someone floated next to him; Phil turned to see a thin, fox-faced man in his late fifties. The shoulder patch of his cammies bore the rocket-and-lightning bolt insignia of the 4th Space, but the four stars sewn to his collar was what caught his attention.

"Gentlemen," Joni said quietly, "General Errol Ballou, the CO of this operation. General, this is Phil Carson and George Mariano, both from United Media."

Carson and Mariano caught each other's eye. The commanding officer in charge of Lunar Freedom. Whatever this was about, it wasn't going to be on the same lines as the press conference a few hours earlier.

Gen. Ballou didn't smile as he shook their hands in a perfunctory way. "Gentlemen, this meeting is off the record. Anything we discuss here is on deep background. No publication, no attribution. Mr. Carson, I trust you're not recording this."

"Uh . . . no. No, I'm not." He pulled his datapad from his pocket, held it up to show that its LED was dark. Joni extended her hand; Phil hesitated, then surrendered the pad to her. She checked to make sure it was switched off, then gave it back to him.

"Thank you, sir," Ballou said. "We're on a tight schedule, so let's make this short. I'm told that you've volunteered to cover the ground phase of the operation."

"Yes, sir, we . . ." Phil's voice was a dry croak; he cleared his throat. "Excuse me. George and I have been on the Moon before, both of us, so we've been certified for . . ."

"I know. We've checked your records just to make sure that you weren't trying to put one over. At least thirty hours of moonwalks, each of you."

"So I . . . uh, I take it you're interested in our proposal," Mariano said.

"More or less." A short silence; Ballou seemed to be sizing them up. "You're better qualified to cover the ground phase than your colleagues," he said at last. "But I'm still unwilling to put the two of you into a combat situation. When our forces touch down at Mare Tranquillitatis we're not expecting a quiet stroll. Our intelligence indicates the Pax will be expecting us, and we'll probably have to fight our way to the Descartes highlands."

So Phil's guess was right; they were planning to make Mare Tranquillitatis the landing zone "However," the general continued, "I'm put in the position of having to balance your personal safety against the public's right to know why we're doing this. You two are best suited for the job, and you've offered to represent the press, and that's why I'm sending you to the Moon."

"Thank you, sir," Phil said. George murmured the same.

Ballou shook his head. "Don't thank me yet, guys. You haven't heard the rest."

Warm darkness. The low background hum of a air-circulation system. The sound of bare feet padding across plastic tiles.

He opened his eyes in time to see something move past tiny red and blue lights. A door opened, allowing a shaft of light to enter the room, then a small figure—a child?—darted through the door. It closed again, and once more he was alone.

Phil felt around himself; his hands

moved across a thick blanket until they found the edge of the bed. He raised his left hand to his chest, discovered that he was naked under the covers. He focused on the tiny lights: the readouts of a medical monitor.

"Lights on," he murmured, and ceiling panels flickered to life. He squinted, raised a hand to his eyes. He appeared to be in an infirmary: white-painted mooncrete walls lined with cabinets, a small sink in the corner, an oxygen mask dangling from a hook above his bed. There was a slight soreness in the crook of his left arm; looking down, he noticed a small bandage on the inside of his elbow. Yet there seemed to be nothing wrong with him; he was weak, but otherwise uninjured.

Phil carefully climbed out of bed. The room was much colder now that he was out from under the covers. Rubbing his goosepimpled arms, he looked around for clothing of any sort, even if it was only a surgical robe. Finding nothing, he pulled the blanket off the bed and wrapped it around himself.

Next order of business was finding the head. A door on the other side of the room led to a tiny water closet; he relieved himself in a bare steel commode, and noted that, when he stepped away, only a minimal amount of water was squirted into the bowl as it automatically flushed.

He stepped out of the w.c., went to one of the cabinets, opened it and found a pack of bandages. He held it at shoulder height, then let it go. The pack fell straight down, but slowly; it took almost two seconds to hit the floor.

"I wish you wouldn't play with the medical supplies, Mr. Carson. They're rather scarce just now, and can't be easily replaced."

He looked around. In the small room, the filtered voice sounded as if it was coming from everywhere at once. "Sorry. Just trying to figure out if I was still on the Moon." He scanned the ceiling, searching for the lens of a hidden camera.

"You've deduced that fact by yourself." The voice was male, somewhat young, but with a European accent and not the quasi-Southern drawl of a loonie. It came from a small grid near the door. Phil still couldn't find the lens.

"Well, thanks for bringing me here . . . wherever here is." Although he had a good idea.

"You're welcome. Oh, stop looking for the camera. It's located behind one of the ceiling panels . . . I forget which one, but it's there."

"Sort of figured as much."

"If you'll be patient, I'll come meet you. I imagine you want some clothes, too."

"If it's not too much trouble."

"None at all. Be there soon."

"Sure. Okay." He sat down on the edge of the bed. As an afterthought, he picked up the bandage pack and put it back where he'd found it. A few minutes later, he heard footsteps coming down the corridor. The door opened again, and his benefactor stepped into the room.

Tall, slender, only a few years older than Phil himself. Narrow-boned face, sallow complexion, thin blond hair brushed straight back from his angular forehead and tied behind his neck in a short ponytail. Wearing a white lab coat over an old brown sweater. There was a bundle of clothes beneath his arm.

"Good morning. I trust you're well rested."

"Can't complain. Is it morning?"

"Only in a manner of speaking. It's still midday local time, but the last time I checked the clock, it was 0900 GMT." A quick smile. "Time's not something I much pay attention to down here." He dropped the clothes on the bed next to him: drawstring trousers, a pullover shirt, underwear, moccasins, a pair of 10-kilo anklets. "Hope they fit. I had to guess your size."

"Thanks." Phil picked up the trousers; a little long for him, but better than wearing a blanket. "Guess you're the guy who found me . . . found us, I mean.

Where's. . . ?"

"Your friend? Safe and sound." He nodded toward the clothes. "Get dressed, that's the first step."

Carson stood up, picked up the underwear. He half-expected the other man to modestly turn away, but he didn't. "So . . . uh, where am I?"

"Sosigenes Center. A small research facility near Sosigenes Crater, maintained and staffed . . . at least until recently . . . by a certain Earth-based company. Don't you want to get dressed?"

"Yeah, sure." He turned his back, shrugged off the blanket, stepped into the underwear. He felt the stranger's eyes upon him. "Located underground, I guess."

"What makes you think that?"

Phil felt his face grow warm. He was glad that he had turned away from the other man. "Nothing. Just a hunch."

"Ah. So. Yes." Each word a distinct syllable. "Yes, we're located underground. Thirty meters, to be exact. This facility was built within lava tubes, with only a few components on the surface. Airlock dome, garage, solar farm, and so forth . . . everything else is down here."

The trousers fit better than he expected, although he had to roll up the cuffs a few centimeters to keep them from dragging on the floor. "What sort of research?"

"Biological. Aren't you concerned with other things first?"

A bio-research lab. Ballou's information had been correct. Phil turned around, picked up the shirt. "My friend. His name's George Mariano, and he's . . ."

"A news photographer, yes. Just as you're a journalist." A small nod. "George is safe. He's in the next room, being treated for his injuries. A broken leg, mild concussion, shock. . . . he's undergone nanosurgical therapy, though, and he's regained consciousness. We'll soon be joining him soon."

"So you know who we are."

The other man chuckled. His discomforting gaze didn't waver as Phil pulled the shirt over his head. "Of course. The first thing I did after bringing you down here was download your suits' memory chips. You're both correspondents, covering the war for United Media International. I take it that you were separated from your unit."

"Our lander was shot down. It crashed about thirty klicks west of here. George and I were the only survivors." The shirt fit better than the pants. "So you were driving the. . . ?"

"The rover you spotted, yes. It wasn't necessary for you to jump and down like that. I saw you as soon as you entered the outer perimeter. You're quite brave, hauling your friend on a stretcher all that way. Very commendable, given the circumstances."

"Circumstances?"

"Neither of you had more than fifteen minutes of oxygen left. You wouldn't have made it here on your own. It was only fortunate I happened to be scanning the area. When I picked up your radio signal, I came out to retrieve you." He paused, and then added: "If you'd left him behind, you wouldn't have used up so much oxygen."

"Never occurred to me."

"Indeed."

Silence fell between them as Phil pulled on the moccasins and fastened the ankle weights. The more he thought about what his benefactor had just said, the less he liked him. Nor did he appreciate being studied; at first he thought it might be sexual interest, but now he realized that it was more clinical in nature, as if he was an interesting specimen.

"What's this about?" Phil gently peeled aside the bandage he'd found on his arm; there was a small puncture mark within his elbow, surrounded by a yellow disinfectant stain. "Did you inject me with something?"

"Only glucose. You were rather dehydrated when I found you. I took you off IV a while ago."

"Uh-huh." Glancing around, he spotted a post with an empty plastic sack dangling from it. "Since you know our names, maybe you'd like to tell me yours."

Hesitation. "Moreau. You can call me Moreau."

"Just Moreau?"

"Yes."

"So, Mr. Moreau . . ."

A dry chuckle. "Dr. Moreau, if you please."

Something tugged at his memory, but he couldn't quite place it. "Dr. Moreau, how many people are at this facility? Besides yourself, I mean."

"I'm here alone." For the first time since he entered the room, Moreau turned away. "Sosigenes usually supports a staff of fifty people . . . researchers like myself, for the most part . . . but when the Pax learned that an invasion was imminent, the others were evacuated to Descartes. I volunteered to remain behind and make sure that none of our ongoing experiments were disturbed."

Phil frowned. "You know, I could be wrong, but . . ."

"Yes?"

When I woke up, I thought I saw a child leaving the room. Didn't you just say that you were alone? But he didn't voice his thoughts. "Never mind. Do you have any idea what's going on out there? The invasion, I mean. I saw something that looked like a battle . . ."

Moreau kept his back turned to him. "I'm afraid it's come out badly. Most of the Marines were killed, the rest routed from Mare Tranquillitatis. Major casualties among the Free Militia as well, but the Americans suffered worse."

"Damn." Then he remembered where he was. "Of course, that means your side won. Shouldn't you be. . . ?"

"Pleased?" A long sigh; Moreau folded his arms across his chest, lowered his head. "War isn't a game, Mr. Carson, regardless of however much we may pretend otherwise. Our violent tendencies are the worst attribute of the human species. You might view it otherwise, but personally, I grieve for the lives lost today, regardless of whose side they were on."

It was the first thing Moreau had said in the last few minutes that Phil believed. The man might be a liar, yet first and foremost he was a humanist. "No argument there. There's stories I'd rather cover than a war."

Moreau glanced over his shoulder. "Really? A story more significant than war?"

"Is there something more significant?"

Moreau smiled. "Let's look in on your friend. Perhaps he's ready for a bite to eat. After that . . . well, we'll see."

Mariano was in the next room, sitting on an examination table as he carefully pulling his drawstring trousers over the semirigid plastic cast that encased his right leg. Moreau took a few moments to examine him. "The compound fractures in your femur and patella have been rejoined," he said, "but it's still new bone. You'll need to avoid putting any weight on your leg for a couple of days. I'll see if I can find something for you to use as a cane."

He left the room, leaving Phil alone with George. There was an uneasy silence; George didn't seem to want to look at him. "Guess I should say thanks," he murmured. "I'd probably be dead now if it weren't for . . ."

"Forget it. You would have done the same for me."

"Don't count on it," he replied, but it was with a wry smile. George winced as he pulled a shirt over his head, then peered at the bandage on his left arm. "What the hell?"

"Glucose on IV. He said we were suffering from dehydration."

"Swell. So what do you make of this place? Think this is what Ballou was talking about"

"Could be. It's in the right location, near Sosigenes Crater. Or at least that's what Dr. Moreau just told me."

"Who?" Phil repeated it, and George shook his head. "Yeah, right. I'm sure that's really his name."

"Why don't you think so?"

"Haven't read H.G. Wells, have you?" George raised an eyebrow. "And you call yourself a writer. But it does give us a clue as to what's going on here."

"He said it was bio research, but he didn't . . ."

Footsteps outside the room. Mariano raised a finger to his lips just as Moreau reappeared, carrying an titanium walking stick of the sort used by lunar hikers. "This should help a bit," he said, handing it to George. "I imagine you're both hungry. If you'll follow me, I'll take you to the commissary."

The corridor was narrow and circular, winding its way around what appeared to be a central core. It was deserted, or at least so far as Phil could tell; all they could hear was a low hum from the ceiling air vents. The doors they passed were shut, but he noted that they were all coded with numbers that began with the digit 3. Moreau noticed his curiosity. "Sosigenes Center is a new facility," he explained. "My company built it just a few years ago, and until now it's been . . . well, not that well known."

Carson glanced at Mariano; the photographer gazed back at him, his eyes wide. As General Ballou had told them, the lab was secret. Yet if it was, Moreau was being unusually candid about its existence, particularly in the presence of two journalists. "So what sort of work have you been doing here?" Phil asked, wondering just how far he could take the line of query.

Moreau didn't say anything at first. He strolled ahead of them, slow enough for George to keep up with him. "At first it was principally agricultural," he replied after a moment. "We were developing ways of genetically engineering new species of various crops . . . corn, wheat, soybeans, and so forth . . . for easier cultivation in a low-gravity environment." He plucked at the sleeve of his sweater. "Our first success was with *Cannabis sativa*. We managed to develop a new strain that yields taller plants in lunar conditions. Your clothes, for instance, are made from lunar hemp."

"Superpot." Phil nodded. "I heard of it. Raised a ruckus back on Earth."

"Back in America, you mean. Your country has such idiotic drug laws . . ."

"So this place is owned by GenSyn."

Moreau turned to look back at him. "Yes. Sosigenes Center was built by GenSyn. I take it you've heard of us."

Too late, Phil realized that he'd tipped his hand. "I remember the net stories," he replied. "Some people think you . . . your company, I mean . . . want to export drugs to Earth."

Moreau chuckled. "If that was our intent, then we would have made more money than we did from raising superpot. Please, Mr. Carson, put away your tabloid mentality. This isn't some redneck meth lab."

Ballou thought it was; that was why he'd allowed them to accompany the advance team, to check out intelligence reports of a GenSyn facility near Sosigenes that was manufacturing illegal drugs for the Pax, which in turn was smuggling them to Earth in order to finance the revolution. Since GenSyn was based on Clarke County, then it was the sort of thing that the military wanted the media to show to the folks back home. Bad enough that the Pax was stopping the supply of He^3 to fusion tokamaks on Earth; now they were also involved in drug trafficking.

He only had Moreau's word to go on, yet Phil had no reason to believe that he wasn't telling the truth. Otherwise he wouldn't have brought them here. "My apologies. I was only . . ."

"Accepted." Moreau continued walking down the corridor. "At any rate, Sosigenes was quite small then, but then we began to branch out into investigating certain aspects of the human genome, and so it became necessary to expand our facilities. This is the third-lowest of four subsurface levels, and it was completed just three years ago . . . ah, here we are."

He stopped at a door marked COMMIS-

SARY. Pushing it open, he called for the lights; the ceiling illuminated, revealing a large room filled with tables and chairs.

"I'm afraid the menu isn't very good," Moreau said as he led them to a dispensary along one wall. "Shipments of fresh food stopped a couple of weeks ago, and we've . . . I've had to make do with what's already in stock."

Phil wasn't about to complain. His last decent meal had been aboard Olympus; the only food he'd had since then had been cold-ration packs aboard the military lander. He inspected the glass doors of the dispensary until he found a vacuum-wrapped tomato and cheese sandwich and what looked like a slice of apple pie.

"Looks like you've had company lately," George said.

At first he didn't see what George was talking about, then Phil saw what he'd failed to notice before. Halfway across the room, a table was littered with discarded wrappers and empty juice cartons. The chairs had been pushed back, as if the people sitting there—six at least, perhaps more—had suddenly left, without bothering to clean up after themselves.

"I thought you told me you were alone," Phil said.

Moreau quietly stood off to one side, either unable or unwilling to reply. Phil walked over to the table: fresh bread crumbs, and one of the juice cartons was half-empty and still cool to the touch. It looked like the sort of mess a bunch of kids might leave behind, as if expecting an adult to come along later and pick up for them.

"I hope you're not going to tell me this is all yours," George said. "You don't look like the sort of person who can't keep the place clean."

"No," Moreau said quietly, "I'm not."

"So who else is here?" George hobbled over to the nearest table; leaning his stick against a chair, he sat down and began unwrapping the sandwich he'd selected. "Don't mean to be rude, but . . ."

"All the same, I'm afraid you are." Moreau folded his arms across his chest. "Gentlemen, there's a limit to my hospitality. I think I've answered all the questions I care to, at least for now. Please eat, then I'll escort you to your quarters."

Phil glared at George. For a little while there, it seemed as if Moreau was going to open up, tell him the truth. Then Mariano had come in with a hard line of questioning; caught in a lie, Moreau had retreated into silence.

George refused to look at him; he realized his mistake. The two men ate in silence, while Moreau stood quietly nearby, not saying anything to either of them.

Perhaps GenSyn wasn't making drugs. Nonetheless, Moreau was hiding something.

Down the corridor from the commissary were a row of dorm rooms. Small and tidy, nonetheless they appeared to have been recently vacated. Pieces of tape on the walls above the desk in Phil's room showed where the last occupant had hung up photos, and in the drawer he found a few pens and some scrap paper. Although the closet was empty, the bed was still made, and there was toilet paper and a half-dissolved bar of soap in the adjacent bathroom.

The desk held a comp terminal. Once Moreau left, bidding him a good night, Phil did his best to keep awake for a little while longer. His eyelids itched and his body craved sleep, yet there were too many questions that needed to be answered, so he sat down at the desk, pulled out the keypad, and began a line of inquiry.

Moreau must have figured that he would do this, because every keyword he typed into the search engine drew unhelpful results. *SOSIGENES* gave him an orbital photo of the crater itself and nothing more, and *GENSYN* rendered standard P.R. material such as annual company reports and recent press releases, none of which mentioned a lunar research lab. He tried to access the net, only to find that he was completely locked out; *UNAUTHORIZED*

USER appeared when he tried to patch into the LunaNet server. So there was no way he could send email, or even logon to a news site to find out what was going on.

Finally, he typed in another word: *MOREAU*. The response was a link to a text within the library system: *The Island of Dr. Moreau*, by H.G. Wells. So Mariano was right; Moreau had borrowed the titular name of a character of a novel published in the late nineteenth-century. Yet perhaps might be a clue here; moving his chair a little closer, Phil began to read:

I do not propose to add anything to what has already been written concerning the loss of the Lady Vain. *As everyone knows, she collided with a derelict when ten days out from Callao . . .*

He tried to keep up with the story for as long as he could, yet it wasn't long before his vision began to blur. He was more tired than he thought. Phil bookmarked the text and shut down the terminal, then undressed and removed his anklets before crawling into bed. He was asleep as soon as he told the room to turn off the lights.

How long he slept, he didn't know; he might have remained asleep for many more hours if the door hadn't creaked open, if a ray of light hadn't passed across his face, if he hadn't felt a small, warm hand upon the side of his neck . . .

He jerked awake, flopped over on his back to see a small form standing next to the bed, captured in silhouette by the light from the corridor.

"Lights on!" he yelled.

The figure squealed in terror, then Phil's eyes were dazzled by the abrupt glare from the ceiling. In that half-instant, he saw what appeared to be a child—long-haired, almost naked, with strangely elongated arms and legs—dart from the room.

Phil whipped aside the covers, lunged for the door. Too late, he remembered that he wasn't wearing his weights; in one-sixth gravity, he sailed out the door into the corridor. He yelped as his left shoulder hit the wall; from somewhere just ahead he heard high-pitched laughter.

Looking up, he caught a brief glimpse of the intruder: no more than a meter in height, wearing nothing more than a pair of briefs. A pair of large eyes peered at him from beneath a mane of hair, then the figure turned and fled, chortling as it dashed down the corridor. Just before it vanished around the bend, it performed a cartwheel, like a mischievous child showing off . . .

"The hell?" Mariano appeared in the doorway of the next room, holding himself erect with his stick. He squinted against the light. "What are you. . . ?"

"C'mon!" Ignoring the fact that he was wearing only skivvies, Phil scrambled to his feet and rushed down the corridor.

This time he was careful not to bound, but instead kept his momentum in a forward direction, taking advantage of lower gravity to turn his run into a headlong sprint. He reached the place where he'd last seen the child, just in time to see a door on the inner side of the corridor slam shut.

Phil skidded to a halt. George came up behind him, hobbling on his stick. A sign on the door read AUTHORIZED PERSONNEL ONLY—DO NOT ENTER, yet the knob turned freely when he tested it. He glanced back at Mariano, and the photographer shrugged. "Your call," he whispered. "I'll say we didn't see it."

Phil nodded, then he opened the door and they stepped inside.

A vast, well-like atrium, one so large that they could barely make out the far side. A volcanic bubble, Phil guessed, restructured to form the station's core. Twenty meters above them, earthlight slanted down through thick panes of polarized glass, illuminating a miniature rain forest. Palmettos crowded each other for room, their fronds casting shadows across the ferns and tall grass that grew upon the atrium floor, their vines curled around the supports of upper-level walk-ways. From somewhere within the branches, they could hear the disturbed cries of songbirds.

Phil's eye caught something resting in the grass, a spherical object. Stepping closer, he kneeled down to examine it: a red-and-white rubber ball, the sort of thing one might find in a kindergarten playroom. And not far away, another toy: a stuffed koala bear, missing one of its eyes.

He reached down to pick it up, and something struck the back of his head.

"Hey!" he yelled, then looked around to see a stick lying next to him. From somewhere up in the trees, a muffled giggle, followed by another one from close by.

A palm nut hit the ground near George. "Man, I don't like this," he murmured as he stepped back toward the door. "This place is giving me the . . ."

"Hush." Phil slowly stood up. "They're just kids. All they want to do is play." That gave him an idea. "Go over there," he added, motioning toward a clearing a few meters away. "Don't act frightened . . . just do it."

George gingerly walked in that direction, his eyes never leaving the dense foliage around them. Phil bent over, picked up the ball. Some murmurs from the treetops. "Okay, catch," he said, then tossed it to George.

Mariano caught it one-handed, still leaning heavily upon his stick, then glanced anxiously at the sound of muted laughter from just behind him. "All right," Phil said, "now throw it back to me. And smile . . . we're having fun."

George reluctantly returned the ball to him. Now there was more laughter, a little closer this time. Another palm nut landed on the ground, but this time it wasn't close enough to be threatening. "That's right," Phil said aloud. "Just a couple of goofy ol' guys, having a game of catch. Here y'go . . ."

He threw the ball to George again, but this time he fumbled and the ball dropped to his feet. George started to lean down to pick it, then stopped. "Phil," he said softly, nodding to his left, "behind you . . ."

Phil slowly peered over his shoulder. A child was swinging upside-down from a tree branch. At first he thought it was the same one he'd seen in his room, but then he noticed that its hair was lighter in color, almost blond . . .

No. *It* was definitely a *she*. About five or six, judging from her height. Yet other anatomical differences weren't nearly so subtle. Her arms were almost as long as her legs, and her toes were nearly as long as her fingers; they were wrapped around the branch, allowing her to suspend herself upside-down. Although her rib-cage looked larger, her frame was so slender that Phil could have wrapped his hands around her stomach and been able to touch his thumbs and forefingers.

Yet it was her eyes that surprised him the most. Twice normal size, with dark-blue irises nearly the size of quarters; when she blinked, he caught a glimpse of nictitating membranes, like a second pair of eyelids.

Utterly alien . . . and yet, without question, a little girl, and a charming one at that. "Throw!" she demanded, and grinned as she extended her hands. "To me! Throw!"

Phil looked back at George. "You heard the lady," he said, stepping aside. "Throw her the ball."

At first, it seemed as if George hadn't heard him. He was frozen in place, staring at the girl with eyes nearly as her own. Behind him, another child appeared upon a low branches: nearly identical to the first, except this one was a boy, possibly the one who'd visited Phil's room. George didn't see him; he retrieved the ball and tossed it to the girl, but it was a clumsy pass and she shouldn't have been able to catch it.

Yet she did. Even before the ball was halfway to her, she swung herself off the branch, performing a somersault so graceful that it would have awed an gymnast, and touched down in plenty of time to catch it. She laughed with glee. "Thank you!" she cried, then she spun around to pitch the ball high into the air, in what seemed to be a random direction.

Another child hurled himself from the top of a palm. He grabbed the ball, yet for a moment it seemed as if he was going to fall to his death. "Got it!" he yelled, then his left foot snagged a vine, and he whipped around to hurl the ball toward a second girl, who shrilled laughter as she deflected it with her right foot, straight into the hands of the boy who'd been lurking behind George.

He dropped to the ground in front of the astonished photographer. "Again!" he yelled. "Harder! Too easy!"

George was barely able to catch the ball. "I don't . . . I don't . . ." He stared at Phil. "What are . . . I don't . . . what the hell are . . ."

"They're my children, Mr. Mariano." Moreau's voice echoed down from above the jungle, where he stood upon a walkway near the ceiling. "So to speak. If you wish, though, you may call them Superiors."

The fourth level of Sosigenes Center was inaccessible except by a single elevator, which could only be opened by keycard and retinal scan. Once they were dressed, Moreau led Carson and Mariano to the Advanced Genetic Engineering Facility; much to their surprise, he requested that Phil bring his pad and George his camera.

"Why are you doing this?" Phil asked as Moreau escorted them down an empty corridor. "Why tell us now?"

"No point in denying it, is there?" Moreau's hands were clasped behind his back. "It wasn't my intent to reveal this to you, or at least not when I brought you here. In fact, I'd hoped that, once Mr. Mariano . . ."

"George." Mariano was loading a fresh film disc in his camera. "Call me George, please." He hesitated, then added, "And what should we call you, Dr. Moreau? And don't tell us that's your real name."

A smile brushed his lips. "Sorry. I should have known better." He glanced at Phil, making sure that his pad was turned on. "Dr. Laurent Marquand," he said, and spelled it for him. "Director, Project Tango Red."

"Uh-huh. And what is Project. . . ?"

"One question at a time, please." Moreau—or rather, Marquand—held up a finger. "First, why am I doing this? As I was saying, I have no choice. I thought that once Mr. Mariano's leg healed, I'd be able to have you out of here before you saw anything you shouldn't. In fact, I've already summoned a rover from Descartes. It's on its way now, and should be arriving within a few hours."

"That's . . . very gracious of you." Phil had no idea how they'd be treated by the Pax. Hopefully not as prisoners of war. "But if you didn't want us finding out . . ."

"But alas, you did." Marquand let out his breath. "One of my children . . . figures it would be Vladimir, since he's always been the most inquisitive . . . saw to that when he disobeyed me by paying you a visit. Twice, in fact."

"Guess he was curious." Phil couldn't help but grin. "Typical six-year-old."

"Six?" Marquand gave him a sidewise look. "Is that how old you think he is? What would you say if I told you that's he's little more than two years old?"

Phil stopped walking. "That's impossible. I was playing ball with him just a few minutes ago. He was . . ."

"The size of a child three times his age, and with the reflexes of a teenager." Marquand made an impatient gesture. "We're getting ahead of ourselves again . . . I hoped you'd leave before you saw any of them, but you did anyway. That limits my options, doesn't it? The only choice I have is to tell you everything, and hope that you'll use that knowledge in the responsible manner."

By now they'd arrived at a door marked with an alphanumeric sequence: GHS-413. Marquand slipped his card into the slot, then bent a little closer to let the scanner examine his right eye. A double-beep, then the door slid open. "Gentlemen, if you will . . ."

They entered a small alcove, a viewing area just large enough for the three of them. A vault door was on the opposite wall, but Marquand walked instead to a large, double-paned window. The room on the other side was pitch-black, save for tiny red and white lights of instrument panels and the faint blue glow of flatscreens.

"The great problem of the exploration of space isn't hardware-related," Marquand continued. "For a long time, it seemed that way . . . we had to invent efficient means of leaving Earth, and once that was done we had to learn how to build space stations, and then how to use the resources of the Moon and Mars to keep ourselves alive. And so we did so, step by step, over the course of generations, yet the greatest single obstacle hasn't been development of reliable spacecraft, but something much more obvious, yet nonetheless so subtle that we overlooked it for nearly a century."

Marquand patted his chest. "It's this . . . the human body itself. *Homo sapiens* are perfectly suited for life on Earth, but our flesh betrays us once we venture in space. Our bones become brittle, our muscles too weak to sustain once we return to Earth unless we constantly exercise or build ships that spin to provide artificial gravity. Our eyes are adapted for only a narrow spectrum of light, and our lower limbs are almost useless in microgravity. So we surround ourselves with redundant layers of technology, praying that none of them fail, hoping that one day we . . ."

He stopped himself, briefly shutting his eyes as if to gather his thoughts. "Hundreds of millions of years ago," he went on, "an aquatic animal squirmed out of a stream somewhere on Earth and, for a brief seconds, learned how to breathe open air. Over the course of time, other creatures learned to do the same thing. All well and good, yet evolution is a slow process, taking eons to achieve its most favorable results. Yet we have the way to accelerate the process . . ."

"And this is what you're trying to do here," Phil said. Behind him, he heard the click of George's camera.

"No." Marquand shook his head. "We're not trying anymore." And then he touched a button on the console beside him.

Ceiling panels on the other side of the window flickered to life, revealing row upon row of horizontal glass tanks. The closer ones were empty, their instrument panels dull and blank, yet the ones farther away were filled with a milky substance, and suspended within them were fetuses in various stages of development.

"Superiors," Phil murmured.

"Personally, I prefer the term *Homo astronauticus*, but the rest of the team thought that *Homo superior* was a more apt term, so . . . well, yes, that's their species name now. Or Superiors, for short."

"Oh, Christ . . ." George moved closer to the window, shooting from as many angles as possible. "I don't believe this . . . I don't friggin' believe this . . ."

"What don't you believe?" Marquand asked. "That we've accomplished this?"

George lowered his camera; there was horror and disgust in his eyes as he regarded the tanks. "That you'd take . . . that you'd take babies and turn them into . . . into these freaks . . ."

"I don't think you understand," Marquand seemed puzzled. "These specimens were created *in vitro* . . . cloned from tissue samples donated by team members. They're not the result of normal human procreation."

"Even worse," George murmured.

Phil was surprised. For as long as he'd known George, he'd never heard him express any anti-cloning sentiments. Perhaps he'd simply never expressed them to him. Marquand stared at them both, more appalled than embarrassed. "Go on, please," Phil said. "You began with tissue samples . . ."

"DNA restructuring began in the cellular stage of development, long before the specimens reached fetal stage. We spent the first three years designing a genetic blueprint, gradually perfecting it until we obtained the desired results." Marquand typed into a keypad; anatomical charts appeared on the window. "Lighter bones with much less potential for long-term calcium loss. Skeletal changes such as double-jointed limbs and greater dexterity for the hands and toes. Greater respiratory capacity coupled with an improved cardiovascular system. Increased resistance to cancer, diabetes, rhinoviruses, and other common illnesses." He pointed to a three-dimensional cutaway of an eye. "The eyes, of course, are an obvious feature . . . the cones of their retinas are more sensitive, their irises expanded significantly, making them capable of seeing in the dark."

"I saw one of them blink. It . . . she . . . looked like she had a second pair of eyelids. Is that to protect their eyes in strong light?"

Marquand smiled. "Yes, but that's only a secondary consideration. This is actually our most revolutionary achievement." He pulled up another image; fine wires led through a tiny socket in the nape of the neck, connecting to a tiny package within the back of the skull. "See this? A microprocessor nanosurgically implanted within the cerebral cortex. Technically, it's called a MINN . . . Mnemonic Interfaced Neural Network . . . but we call it an associate."

"A computer in the brain?"

"Yes. One gigabyte onboard memory. But more importantly, it enables the children to interface with computer systems within their environment . . . Sosigenes's own AI, for instance. We've just begun tutoring them in how to use them. Once they become proficient, they'll be able to converse with AIs in two ways. A subcutaneous vocal implant in their inner ear and lower jaw . . . we've already begun testing those, with positive results so far . . . and also what we call an eyes-up display."

Marquand's hand moved to his own eyes. "When they blink rapidly three times, as they're learning how to do, the inner eyelid comes down and they're able to see what appears to a hologram. In reality it's a personal computer screen, displaying information relayed to them from their associate. Coupled with subcutaneous implants, this gives them direct verbal contact with any computer linked to MINN system."

"So, you mean if I had one of these . . ."

"You can't. It has to be installed in the brain while its still the early fetal stage."

"Okay, but if I did, and I asked . . . oh, say, which way to the men's room . . ."

"And then you'd blink three times, and the associate would show you a map on the eyes-up. Or it could display a spacecraft control system and lead you through a step-by-step procedure of how to use it. You can even load information into a terminal, and the children will be able to call it up at will, then download it to wherever they want." He pointed to Phil's pad. "Like having one of them imbedded in your brain, ready to be used at any time."

"Sick." George took another picture of the lab. "This is really sick."

"Why do you say that?" Marquand peered at him. "Because we've tinkered with the human body?"

Mariano didn't look at him. "You said it. I didn't."

"But we've been doing much the same thing for nearly a century, beginning with the advent of cardiac pacemakers. " Marquand shook his head. "We're on the verge of a new era . . . a time when humanity will be able to live in space as if it evolved there. Within two or three generations, humankind will be utterly transformed."

"Uh-huh." George turned to aim his camera at Marquand. "So I take it that you think Wells was on the right track. With *The Island of Dr. Moreau*, I mean."

"Wells was ahead of his time." At first, Marquand seemed reluctant to having his picture taken; then he relaxed, and struck a pose next to the window. "But he couldn't have foreseen what we're doing here. This is Moreau raised to the next level."

"Sure. Moreau to the second power." George snapped the picture. "But you're forgetting how the story ends, aren't you? Moreau's creations . . ."

"I think that's enough for now." Marquand's smile faded. "No doubt you'll want to rest before the rover gets here." Stepping past them, he opened the door. "If you'll follow me, I'll take you back to your quarters."

Phil was tired; he hadn't slept very long before Vladimir had awakened him, and he knew he had to get some sleep. Yet as soon as he was alone again, he found himself sitting cross-legged on the bed with his pad in his lap, working on his lead:

MARE TRANQUILLITATIS, THE MOON; JAN. 27, 2052 (UMI)—The existence of a new race of genetically-engineered humans was made public today by a senior scientist involved with the project. Known as homo superiors, *or "Superiors" for short, they are the result of a secret three-year program aimed at developing . . .*

There was a quiet knock upon the door. Phil barely had time to fold the pad and shove it beneath the covers before the door opened and Laurent Marquand stepped in. "I hope I'm not disturbing you," he said. "I saw your light still on, and thought this might be a good time to have a talk."

"I was about to take a nap, but . . . sure, what's on your mind?" Phil shifted a little on the bed, making sure that the bulge made beneath the covers by the pad was hidden by his body.

"I was wondering what you plan to do with what I've told you." Although Phil gestured to the chair, Marquand preferred to remain standing. He closed the door behind him. "I hope you don't intend to write a story about this."

"Well . . ." Phil was glad he'd taken precautions. "You invited me to bring my pad and George to bring his camera, and what you told us constitutes an interview. Little late to be having second thoughts, isn't it?"

"I'm not sure it is." Marquand crossed his arms. "I believed that you'd treat this with an open mind. And to your credit, you have. But your colleague didn't take this very well. It's not hard to see that he thinks this is immoral."

"George isn't writing the story." Too late, Phil realized that he spoken in the present tense. "Or at least he won't be," he quickly added. "He just takes pictures . . . it's going to be my byline."

"I understand. All the same, it makes me wonder if public disclosure may be premature, at least at this time." As he spoke, Marquand's gaze drifted around the small room; Phil wondered if he was searching for his pad. "Once news of this gets out, quite a few people may share his reaction. And although we're quite some distance from most of your readers, I have to take the children's safety into consideration."

"You don't believe the Pax will protect you?"

"Only a few of their leaders know about this. Tango Red was undertaken by GenSyn, not the Pax, and they may feel threatened by this." Marquand raised an eyebrow. "After all, this is the next stage of human evolution. Image what might have happened if Neanderthals had opened the morning paper and discovered that Cro-Magnon man had suddenly arrived on the scene."

Phil couldn't help but chuckle at the mental image of a caveman squinting at a pad, perhaps with a cup of coffee in his hairy hand. A dark frown appearing on Marquand's face. "I'm sorry you find this so humorous," he went on, "but you must realize that you share some responsibility for this."

Phil stopped grinning. "No, I don't. Not at all. I'm a journalist. It's my job to report the news. My only responsibility is to be as fair-minded and objective as I can be. I didn't set out to produce a new race, you did, and now that I know about it, it's my duty to report it."

"But it wasn't my intent to let you know . . ."

"It wasn't? I wonder about that. When we first met, you hinted that there were stories more significant than war. Maybe you were just making conversation, but you knew you were talking to a reporter . . . didn't you think that would get my attention? And on two different occasions, one of your Superiors . . . your children, as you call them . . . got loose and visited me. If you're so concerned about their safety, why did you leave their door unlocked? And isn't it odd that you just happened to be around when George and I found them . . ."

"These were accidents."

"No . . . no, I don't think so." Phil shook his head. "A secure research facility, and you let two reporters wander around. No, these weren't accidents. You saw a chance to stage a news event . . . I saw the way you posed for George when he took your picture . . . but now you think you may have made a mistake, and so you want to put everything in reverse."

Marquand said nothing. His arms folded across his chest, he looked down at the floor. "I see . . . and you don't think you owe me anything? Not even after having saved your life?"

"I owe you fair and unbiased coverage. I would have done that even if you hadn't rescued George and me."

"And there's nothing I can say that would convince you to forget what you've seen? Just claim that this is an agriculture research lab?"

"We're way beyond that now. Like you said yourself, this is more important than the war." Phil hesitated. "Since we're laying down our cards, I'll put down an ace of my own. It's no coincidence that we crashed near here. George and I were accompanying an advance team of Marines assigned to check out this facility. They had intelligence reports about something at Sosigenes, but they thought . . ."

"We were making drugs." A faint smile that quickly disappeared. "How ironic. If I'd known, I might have shown you the labs on Level Two and dropped hints that they were being used for that purpose. The lie would have been less harmful than the truth," He sighed, tucked his hands in his coat pockets. "But what if I were to tell you, in all truthfulness, that you *are* involved? That you do indeed have a personal stake in the outcome of this story?"

"I . . . I don't understand."

"I've deceived you more times than you realize, Mr. Carson. When you asked me about the bandage on your arm . . ." Phil glanced at his left elbow ". . . I told you, just as I told Mr. Mariano, that you've received intravenous glucose as treatment for dehydration. That's an untruth. The fact of the matter is that I took something from you instead . . ."

Phil felt his face grow pale. "Tissue samples."

"Only a few dozen people have worked on this project, and for various reasons not all of them were suitable donors. One of the problems we've had in working in such a remote location has been securing tissue from a wide gene pool. So when the opportunity presented itself . . ."

"You're out of your mind!"

"A mad scientist?" A corner of Marquand's mouth ticked upward. "Oh, please . . . but keep in mind that the next Superior born here may be your own genetic offspring, or George's, just as much as Vladimir is mine."

Now he looked straight at Phil. "Do you feel as objective as you did before? Do you still think that what happens to them is none of your concern?"

Without realizing what he was doing, Phil absently let his hand drift toward the lump beneath the bedcovers. "You're right," he admitted. "It is my concern . . . more than before." Pulling aside the covers, he picked up his pad. "Which is why it's important that I finish this story, and file it as soon as possible."

"I see." Marquand let out his breath. "And the fact that I've locked out your net access . . ."

"The rover will be here soon. Soon as George and I reach Descartes and we clear things with the locals, I'll use their dish. It may take a while, but . . ."

"UMI will still get their story. Of course." Marquand walked over to the door, opened it. "I have to admit, Mr. Carson, you're a man of integrity."

"Just a guy doing his job, Dr. Moreau . . . Marquand, I mean."

Again, the elusive smile. "So am I, whether you care to believe it or not." And then he left, closing the door behind him.

Phil slowly stood up, groaning as sensation returned to his cramped legs. He should have been relieved, but he wasn't. It might have been a mistake to be honest with Marquand; he might not be mad, yet he was clearly committed to his cause. Even if he allowed him and George to leave Sosigenes, he could still prevent the story from getting out. He had contacts in the Pax, and they would be able to stop them.

Yet Phil had to find a way to send a dispatch back to Earth. If only there was . . .

He glanced at the desk terminal, and an idea came to him. It might not work, but it was the only shot he had. Ignoring his exhaustion, he sat down at the desk and continued writing his story. This time, though, he didn't use his pad, but wrote on the terminal instead.

If he worked fast, he might be able to finish before the rover arrived.

Phil heard the atrium door open, but didn't turn around to look. Squatting in the grass beneath a dwarf palm, he kept his attention upon Vladimir. The little Superior boy stood before him, waiting for Phil to throw the ball back to him. He would, but first they had to finish their game.

"Simon says, 'Send.'" Phil kept his voice low, hoping that he wouldn't be overheard.

"Mr. Carson . . ."

"Send!" Vladimir chirped, and his eyes blinked rapidly three times.

Phil let out his breath. He hoped Marquand didn't hear that. "Catch!" he said, then tossed the ball into the air. Vlad raised his hands to catch it, then realized that he'd been duped and let it fall. "Ah-ha!" Phil laughed. "Simon didn't say 'catch'!"

"No fair! Tricked me, you did!" Vlad bent down to pick up the ball. "Now my turn. Simon says . . ."

"I'm sorry, Vladimir. Mr. Carson has to leave now." Marquand stood at the edge of the clearing. "That's a good game, though. We'll play it again sometime."

Vlad frowned, holding the ball in his hands. "Play no more? Away, you go?"

"Afraid so, kiddo. Gotta head back to where I came from." Phil pointed to the crescent Earth hovering in the black sky above the atrium windows. "Earth? You know that place?" Vlad nodded solemnly; it was a world he'd never visit, but he saw it every day. "Don't worry . . . when I come back, you can show me all the games you've learned."

The boy beamed at him. "Simon says. . . !"

"Another time, Vladimir. We have to go." There was impatience in Marquand's voice, yet Phil was secretly relieved. If Vlad had repeated everything Phil had said during their game . . . "The rover has arrived, Mr. Carson. And I think your companion would like to depart."

"Sure. No problem." Phil took a moment to ruffle Vlad's hair, then he stood up and followed Marquand out of the atrium. He heard a vague motion behind him, but when he looked back, Vlad had disappeared into the trees, leaving his ball behind.

Mariano was waiting for them in the corridor, his rig slung across his shoulder, an annoyed look on his face. "You could have told me where you were going," he murmured as they joined him. "We had to look all over for you."

"Sorry. Just wanted to spend a little

more time with the children." And he couldn't take a chance on Marquand finding both of them missing. He looked at Marquand. "Vlad's a great kid. You say he's your . . . I mean, he's cloned from your genes?"

"Yes, he is." Marquand seemed to take a certain paternal pride. "And you shouldn't hesitate to call him my son. I consider him as such." He paused. "Obviously he likes you, too. It never occurred to me to teach him that game."

"Try it some time. He's pretty good at it." *More than you know*, he silently added.

They'd just stepped aboard the elevator when Phil realized they had missed a step. "Our suits," he said. "We're going to need our suits if we're going to leave."

"Not necessary." Marquand touched the top button. "The rover's fully pressurized, as is the ramp. Besides, Mr. Mariano's is ruined. I had to cut it off him in order to treat his injuries."

George gave Phil a wary glance, but neither of them said anything. A few seconds later, the doors opened, and Marquand led them into the airlock dome. There were plenty of moonsuit lockers, yet through a window they could see a rover parked just outside, an accordion walkway extended to meet its aft boarding hatch. No reason for them to put on suits.

"Looks like they sent out the stretch limo," George remarked, and now Phil saw that the vehicle was a long-range rover: an eight-wheeler segmented into two sections, the kind used for major expeditions. Yet Descartes City was less than a hundred miles away, and this wasn't the sort of vehicle sent out for a brief sortie.

"I think they're short of equipment just now," Marquand said, then he turned to Phil. "There's nothing I can do to change your mind? Nothing I can say that will make you reconsider reporting what you've seen?"

"We talked about this last night. We do what we have to do . . . that simple."

"Even if it means putting the children at risk?" Marquand raised an eyebrow. "Or is the public's right to know more important?"

"I think the public . . ." Phil hesitated. "I believe people are smarter than you think they are. If you just tell them the truth and let them make up their own minds, then they generally do the right thing."

"I wish I could believe you, but . . ." Marquand touched a button on the wall, and the ramp hatch irised open. "As you say, you do what you have to do."

"We'll be in touch." Phil ducked his head and entered the hatch.

"What was that all about?" George said quietly as they marched down the ramp.

"Later," Phil murmured. "Let's just get out of here."

They had been traveling for nearly an hour when Phil felt the rover suddenly hit tough terrain. Until now, the vehicle had been moving along a graded road leading from the edge of Mare Tranquillitatis into the Descartes highlands. George had crossed his arms across his chest and closed his eyes to take a nap, yet Phil had remained awake, and with the first hard bump he looked up from the H.G. Wells novel he'd been reading on his pad.

Glancing out the window, he saw that the landscape had changed. Small hills, bleached by raw sunlight, rose around them. Another sharp lunge, and he realized that the rover had just gone across a small boulder. Its oversize wire-mesh tires and independent suspension were usually enough to take on rocks and micrometeorite craters, which meant . . .

"Huh? Wuz'happenin?'" George woke up, grabbed for a safety strap. "What's going on?"

"I think we've left the road." They were in the rear passenger compartment, surrounded by ten empty seats. They'd met the driver only briefly—a dour young man, wearing a scalplock of the kind favored by loonies—before he'd shut the inner hatch leading to the forward tractor. Phil reached up to the com panel above him. "Hello? What's happening up there?'

Another bump, then the rover came to a abrupt stop, hard enough to throw them out of their seats. "Oh, for chrissakes . . ." George stabbed at the button above his seat. "Hey, what's the deal? Run out of gas or something?"

No response. Phil got up, walked forward to the hatch. He was about to grab the locklever when he felt a sudden jolt. A second later, the lights went out.

"Hey! What the. . . ?" George angrily hit the intercom once more. "Yo! Moondog! You got a problem or what?"

There was a silence that he'd never heard before . . . or at least not in space. The sort of stillness one takes for granted on Earth, but not out here. Feeling a chill, Phil raised a hand to a ceiling vent. No air was coming out.

"Oh, God!" George was peering out the window next to his seat. "Oh, man, look . . . he's cut us off!"

"I know." Phil didn't need to look outside to know that the tractor had just detached itself from the trailer. When it had done so, it had also severed all service lines leading to the rear half of the rover.

No power. No air.

Phil slumped into the nearest seat. In a few moments, the temperature would start to rise. Or maybe it would fall? No . . . the sun was up, so that meant they were going to sweat awhile. Or at least until the air ran out.

"Mayday! Mayday!" Lurching on his stick, George had gone to the back of the trailer to open the panel leading to the emergency radio transmitter. "Rover down! Repeat, to all stations, rover down, at . . ." He looked at Phil. "Where are we, anyway?"

"Doesn't matter." There were suit lockers across the aisle from him. In frustration, he raised a foot and kicked one of them open, and wasn't at all surprised to discover that it was empty. "Give up. The short-range is disconnected. Probably pulled the plug on the sat dish, too."

Marquand was a smart man; he wouldn't have left anything to chance. Phil gazed out the window again; the tractor had disappeared, but it probably lingered somewhere nearby, perhaps just beyond that range of hills. It would remain there for a few hours, then the driver would return. All he needed to do then was fit their bodies into a couple of moonsuits, then take a trip out to the crash site. Two corpses found near the wreckage of crashed lander, one with a broken leg. Waiting for rescue until their air ran out.

Just two more reporters to die in a combat zone . . .

Phil chuckled, shook his head. "What's so goddamn funny?" George demanded.

"Y'know that kid? Vlad, the one I was playing with?" Phil wiped his eyes with his fingers. "I taught him a game. Simon says . . ."

"I don't give a . . ."

"No, really. It's a great game. Especially if he's got a MINN implant and voice-activated computer access. All you have to do is get him to go eyes-up and repeat everything you say. Simon says, 'Search for file Carson-slash-urgent.' Simon says, 'Open Luna-dot-net.' Simon says, 'Open email to editor-at-UMI-dot-com.' Simon says, attach file Carson-slash-urgent. Simon says, 'Send . . .'"

"You didn't tell me." George stared at him from across the compartment, his voice becoming harsh in the thinning air "Why didn't you tell me? I could have attached my . . ."

"Simon says, 'Stop being such an . . .'" Phil stopped himself. "Naw, forget it." The compartment was becoming warm, his head getting thick; all he wanted to do was close his eyes, take a nap. "Shut up and sit down. It'll be over soon."

He laid his head against the seat cushion, gazed up at the distant sliver that represented home. A lousy assignment, but at least he'd filed one last time.

One day, his children might thank him for this. ■

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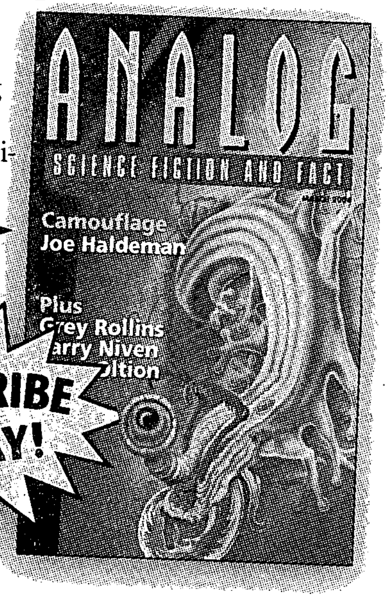
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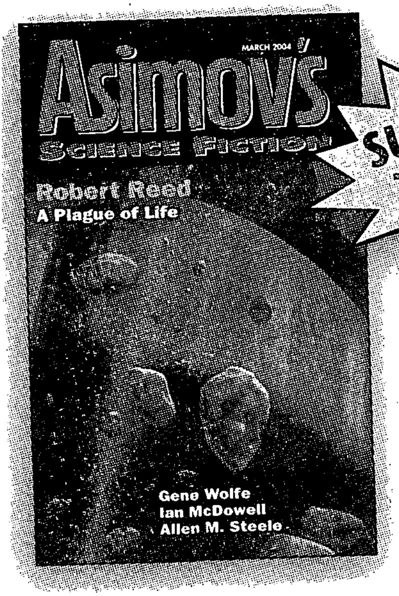
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Special Feature

Dear Analog:
A HISTORY OF BRASS TACKS

Kyle Kirkland

It's December 1929, and you walk by a newsstand on your way home from work—the papers are full of bad news and you're lucky to still have a job, considering the stock market crash a few months ago. But then you see something that makes you temporarily forget your troubles: a magazine with the title ASTOUNDING flying across the cover, along with a picture of a man fighting a human-sized beetle.

You pick it up, thumb through the pages. The paper's cheap, the edges untrimmed. The first story is "The Beetle Horde" by Victor Rousseau. You flip back to the page describing the new magazine, how it's going to "anticipate the super-scientific achievements of Tomorrow."

You look at the price. *Everybody* looks at the price, these days. Twenty cents. You rustle up the coins in your pocket, do a quick calculation. Then you plop the magazine down on the counter.

And thus you make history.

I wonder if the people who bought that first issue of *Analog*—then known as *Astounding Stories of Super-science*, and dated January 1930—knew that they were buying the debut of a magazine that would still be around well into the twenty-first century. Which seemed an awfully long way off in 1929.

Many of these readers might have known, or guessed, that the magazine would survive that long. Some of them were at least partly responsible for making it happen.

Lots of people can share in the credit. The editors, for instance. So far there have been only five: Harry Bates (January 1930 - March 1933), F. Orlin Tremaine (October 1933 - September 1937), John W. Campbell (October 1937 - December 1971), Ben Bova (January 1972 - November 1978), and Stanley Schmidt (December 1978 - present). Credit the writers, too: Asimov, Heinlein, van Vogt, Williamson, Moore, McCaffrey, Anderson, Harrison, Reynolds, Zahn, Flynn, Burns, Bujold, Asaro, Oltion, Burstein, Lerner. . . .

But there are many others who also deserve credit. Readers are the life's blood of any magazine, and especially valuable—crucial, in fact—are those readers who aren't shy about voicing their opinion every once in a while. Like many of the people who bought that very first issue, and those of us who got on board later. Letters to the editor are published in this magazine in a section that presently goes by the name "Brass Tacks." By far the most influential letter was by Richard A. Hoen in 1948, but there are plenty of others in the long history of *Analog*.

The Early Years

In the first issue editor Harry Bates made a request for letters. "Write In" he urged; "It is *your* magazine and we want you to help run it to your satisfaction."

The first letter column appeared in the last pages of the April 1930 issue. It was called "The Readers' Corner." Readers were told that "this department is all yours, and the job of running it and making it interesting is largely up to you."

Bates meant what he said; for the most part, he stayed out of it. Letters were printed but not answered, at least not in the magazine (apparently Bates often responded to letters privately, but didn't print his reply). The letters were published with only a short, introductory preface: "Thanks, Mr. Marks!," "A Fine Letter," "A Young Reader's Favorites," and so forth. Occasionally, if the reader asked an important question that Bates could answer in a few words, the introduction to the letter was his reply. (As I was reading these old letters, I found this format—the answer preceding the question—very amusing because it reminded me of humorous skits where a purported "seer" holds up a sealed envelope and blurts out an answer, then opens the envelope and reads the question.)

Many *Astounding* readers of the time were also not quite satisfied with the format. A lot of them asked for editorial comments on the letters; this included, by the way, a young reader from Brooklyn whose first letter was published in February 1935. (More on him later.) But the editors steadfastly refused: first Bates, then Tremaine (who didn't want to have the "last word"), then Campbell, in the early part of his tenure, merely prefaced the letters with a short introduction. Editorial responses at the end of letters didn't begin until Campbell started doing it in June 1950.

Early Readers' Corners were filled with fan letters. It was an exciting time and the letter column was an exciting and lively place. The magazine was a real "lallapaloozer." The letter-writer's address was often printed below his or her name, and of course readers quickly recognized (as they had in other magazines) that this was an excellent way to find correspondents. A large fraction of these early letters ended with a plea for pen pals. Evidently they got them, too. Clubs formed, with names like "Science Correspondence Club," "The Scienceers," "The Boys Scientifiction Club," and others. Fan magazines started, such as *The Time Traveller*, mentioned in a letter from Forrest J. Ackerman in November 1932.

Many readers described *Astounding* as "our" magazine, and thought of themselves as associate editors. Some of the names appeared in the letter column repeatedly: Forrest J. Ackerman, Jack Darrow, Linus Hogenmiller, Bob Tucker, and many others. They threw "bouquets" (praise) and "brickbats" (criticism). They identified the stories they liked and the ones they didn't. They continually asked for trimmed edges (which they would finally get in 1936). They wanted the pages of the magazine to be larger (which would only happen briefly in the 1940s and again in the 1960s). They wanted "quarterlies" (additional issues of the magazine) and they wanted the magazine to go weekly or twice monthly, which didn't happen. And they wanted reprints.

Reprints. It sounds a bit strange, wanting reprints; this was the threshold of the "Golden Age" of science fiction, which is typically defined as beginning in the late 1930s. Yet many readers asked for the good old stuff: H.G. Wells, Jules Verne, Edgar Rice Burroughs, A. Merritt, Sax Rohmer. So many readers requested reprints that Bates wrote a brief editorial in The Readers' Corner of July 1930 explaining why he wouldn't do it. Sure there are plenty of fine old stories, argued Bates, but "aren't even *better* ones being written to-day?" And the good old stuff is, well, old: 99% of readers "have already read, or had a chance to read" these stories. And what about new authors? Don't they need to eat?

Bates's arguments were accepted by some, debated by others. Many people didn't believe that 99 percent of *Astounding* readers had read the old stuff (which wasn't what Bates had claimed—he said they either read it or *had a chance* to do so). One of the most thoughtful letters on the subject was in November 1930 by P. Schuyler Miller, who would go on to have such a tremendous impact on science fiction in his Reference Library columns in *Astounding/Analog*. (He argued in favor of reprints in this letter.) The reprint controversy went on for years, but with a few exceptions the magazine has stayed reprintless.

Sometimes the brickbats got quite nasty. Some readers complained that the science in the fiction was inaccurate and the stories were stupid. M. Clifford Johnston wrote: "How anyone, save a young child or moron, can read and enjoy such futile nonsense is incredible." Bates prefaced this letter with "Are We All 'Morons'?"

Not only did readers write letters about the stories, they also wrote letters about *other* letters (published in earlier issues). Mr. Johnston's letter, for instance. Gertrude Hemken had this to say: "I want Mr. Johnston to get this point: what we want is fiction, pure Science Fiction and not instructions." Stories, in other words; not science lectures. (Bates introduced this letter with "Gr-r-r—She's Mad!") The question of how much science should be in science fiction is still with us, of course.

Looking back on the old "pulp" era (so named for the cheap paper), most critics today regard these stories as pure entertainment: shallow and "juvenile," filled with one-dimensional characters and scientifically impossible gadgets and backgrounds. Well, some were—and some weren't. And even back then, readers—including juveniles—seemed to know the difference.

Consider M.L. Staley's "The Stolen Mind," for instance. This story in the first issue of *Astounding* is about a character named Quest whose mind is stolen by some mad scientist. (An "osmotic solution" is mysteriously involved.) It's not a good story, and virtually all the letters in The Readers' Corner panned it, severely and indignantly.

Consider another story in the first issue: "Tanks" by Murray Leinster. Readers wrote letters of praise for this one. The plot involved a war fought mostly with mechanized vehicles. It's too bad that not enough people paid attention to this "juvenile" story; a decade later Hitler's panzers rolled over Europe in a matter of weeks.

Ellen Laura Nightingale's October 1930 letter sums it up nicely: "I am only a mere girl (that accounts for this poor typewriting)—only ten years old—but I know my likes and dislikes." If readers hadn't, and hadn't voiced them, the Golden Age probably would have never happened.

Toward the end of his tenure, Bates instituted a number of additions and changes, one of which was a tendency to insert editorial comments (inside brackets) in the letters. Often these comments consisted of one word: "Censored." SF readers were, as now, a cantankerous bunch. Once, in addition to "Censored" he added "Let us have peace." Alas, he didn't get it. The column remained as tumultuous as ever.

Brass Tacks

Times were tough in the 1930s depression, and the original publisher of *Astounding*, Clayton Magazines, went bankrupt. The March 1933 issue was the last *Astounding* to appear until Street & Smith picked up the title and published their first *Astounding* in October 1933. The new editor was . . . anonymous (no name was on the masthead).

The December 1933 number contained a new department: "Brass Tacks" (which I'll often shorten to BT for the rest of this article). Subtitle: "The Open House of Controversy." As indeed it proved to be.

The new *Astounding* changed a bit from the old. "Our purpose is to bring to you each month one story carrying a new and unexplored 'thought-variant' in the field of scientific fiction." New ideas, exploring novel themes and concepts. And more sophistication, more stories "to open the way for real discussion" about the future.

At every juncture in *Analog*'s long history, when a drastic change is made, letters of lament invariably appear in the letter column. It's inevitable, I suppose, that a percentage of readers will yearn for the "good old days," just as they did in Bates's time (asking for reprints). According to some readers, the new magazine just wasn't "up to what it used to be" and the stories in the new *Astounding* weren't so astounding. There were debates over what was science fiction and what was "weird" fiction. Readers didn't want "thought-variants" that were "a variation from the possible."

But gradually the readership mostly accepted the magazine; new readers came aboard, old readers were either won over or went away.

One thing many readers asked for—and got—was an increase in the size of BT, which was as lively as its predecessor. The department expanded to as much as 9 or so pages, with a minuscule font size. And there was still room for only a fraction of the letters (one month in 1935 the editor reported getting 287). Readers made suggestions, rated the stories, argued with each other over just about everything.

Drawing considerable comment was a series of "fact features" by Charles Fort, the first nonfiction of significant length in the magazine. These articles were originally published in a book called *Lo!* in 1931; Fort (1874-1932) collected numerous stories of strange phenomena and unexplained events, upon which he made speculative comments. Some *Astounding* readers described Fort's articles as well done and interesting, some thought they were "interesting but stupid," some found them silly. The best letter was from William Sykora, who was glad that *Lo!* appeared in *Astounding* because it "at least paves the way for better, more interesting and more educational superscientific articles."

Other arguments involved the science in the stories. (The gleeful reporting of errors—real or imagined—is one of the most common and recurring themes in Brass Tacks.) A debate raged in 1935 over the law of conservation of energy. In "The Irrelevant," a December 1934 story, a rocket apparently violated the physical law which states that energy cannot be created or destroyed. The argument over whether or not the law was actually violated in the story—as well as whether or not the law was actually true—lasted nearly a whole year, with attacks by readers and counterattacks by the author, Karl van Kampen.

BT was full of abstruse equations and formulas. One letter in April 1935 was from a reader in Wilkes-Barre, Pennsylvania, by the name of David Bohm; I'm pretty sure—though I can't confirm—that this is the famous iconoclastic physicist, who would have been a teenager at the time. The debate raged for so long and was so bitter that some readers began have some fun with the story's title. So did the author—but that was after he became editor.

Another recurring Brass Tacks phenomenon: letters from unknowns who later went on to become famous authors. It's happened often throughout *Analog*'s lifetime. One notable case was the thoughtful and well-written letters of Ramon F. Alvarez del Rey, who would later gain much fame as writer, editor, and publisher Lester del Rey. His letters had "future author" stamped all over them. Even other readers noticed; one BT letter wondered if del Rey wasn't actually John W. Campbell (who at the time was one of the most popular SF writers, except for that story he wrote as Karl van Kampen). This complimentary letter, by the way, was written by Milton A. Rothman—himself destined for some fame as a scientist and science writer.

Another example: the kid from Brooklyn I mentioned before. His name was Isaac Asimov. He wrote many fan letters in the late 1930s, and one Brass Tacker described the "argumentative Asimov" as his favorite letter-writer.

And then there were other letter-writers, vastly less insightful. Numerous letters, most of them insulting, began with something like, "bet you won't print this letter." Right off the bat the writer makes a significant bet—and loses—which doesn't encourage anyone to take the rest of the letter very seriously.

Other letters discussed the future. One perspicacious reader thought that cigarettes, while commonplace at the time, probably shouldn't appear in SF because they'll be restricted or banned in the future. Another reader, a bit less perspicacious, didn't like the ship-lifting-off-Earth stories, because "it's possible, I suppose, but unlikely."

I mentioned Tremaine's name wasn't on the masthead. In May 1934 he wrote that he didn't want to reveal his name, even though people had asked. Letters during this time were addressed "Dear Editor," and some readers speculated as to who the editor was. Which is interesting, because in December 1933, in the publisher's fine print, the name F. Orlin Tremaine appeared as editor. But not too many people, it seems, read the fine print. (Not even the editor.) However, many people read E.E. Smith ("Doc" Smith, the author of numerous space operas), and when a letter of his appeared in BT which began "Editor Astounding Stories Dear Tremaine," all pretense of anonymity was lost.

Everything was going fine in the mid 1930s and Tremaine was doing well. Then he killed BT.

Science Discussions

"You who have been steady supporters of science-fiction have noted the tendency of letters in Brass Tacks to become monotonously alike." Thus wrote the editor in November 1936. Although he got hundreds of letters a month, "they represent less than two per cent of the reading audience"—in other words, only a few readers were contributing most of the letters. So BT should be replaced, but with what?

Discussions of science. From the January 1937 issue: "You and I, each in our small way, may help to contribute vital thoughts to the general science, and Astounding Stories will be our medium of expression." Thus in February 1937 BT disappeared and "Science Discussions" took its place.

Obviously this made some of the readership very happy. The letter column was now filled with scientific speculations, equations, diagrams, and formulas. A few BT-like letters slipped in (such as Fred Pohl's May 1937 letter regarding science fiction conventions), but in general *Astounding*'s letter column looked like a physics textbook.

But Brass Tacks didn't stay dead for long. In November of 1937—just after Campbell took over as editor—BT was resurrected; evidently its premature demise had been lamented by a vociferous faction. The editor wrote: "We won't discard 'Science Discussions'—it's too popular—but as always, I bow to YOUR will as soon as I'm convinced." BT was appended to the letter column, appearing after Science Discussions. Underneath "Brass Tacks" was written: "Do you want this department restored? If so—write now!"

They did, and BT survived. But for a while it continued to take a back seat to Science Discussions, at least in terms of order (Science Discussions was printed first). Frequently, however, BT got a large number of letters and Science Discussions fewer; for example, in May 1938 there were 3 letters in Science Discussions and 12 in BT. And so BT gradually outmuscled its rival; in late 1938 it appeared first in the Table of Contents, and in July 1939 the letter column was headed by "Brass Tacks" with "and Science Discussions" below in smaller print. Science Discussions received fewer and fewer contributions until it fizzled out entirely in early 1941.

The Campbell Era

John W. Campbell was one of the most influential figures in SF, but he, like everyone else, took his share of criticism in Brass Tacks. A June 1938 letter calls him "Dictator Campbell."

But Campbell proved to be very responsive to readers. In March 1938 Peter R. Rawn suggested a new department: "Every month you could list the stories of the previous month in the order of their popularity. . . ." It was an idea that had been in the air for some time, and in May 1938 the first Analytical Laboratory appeared. (Anlab was a monthly feature until the late 1970s, after which it became annual.)

Early winners of Anlab include Don A. Stuart, which was Campbell's (more popular) penname. BT letters praised Stuart and asked for more stories, which must have gratified Campbell but made him perhaps a little wistful, for he simply had no time to write them. Campbell prefaced one letter this way: "Stuart, I'm afraid, has had to retire due to pressure of outside work." In a preface to a 1943 letter he admitted Stuart was his penname.

Campbell became well known for buying the early work of then unknown but soon-to-be famous authors, and BT and Anlab sanctioned many of his decisions. For example, Robert A. Heinlein debuted in August 1939, and many more of his stories followed. Heinlein was truly special; a lot of great authors have appeared in the pages of this magazine, but readers praised Heinlein like no other writer before or since. (Campbell even printed Heinlein's future history timeline in the May 1941 BT.)

Campbell encouraged reader involvement not only in BT and Anlab, but also in a new department called "Probability Zero" (PZ). This was a short story contest "for all and sundry liars"; the contributions were supposed to describe logical-sounding but impossible events, and readers would determine the winner in an Anlab-like vote. The first PZ in April 1942 featured two established writers, but after that the real contests began. Seven writers appeared in first one, published in July 1942. (The winner was a lad by the name of Ray Bradbury, who won $20.) Several more PZs appeared irregularly over the next few years but the department vanished after that. (It was revived in the 1970s as a joke story department.) One of the most interesting PZ contests was in 1944 when a Brass Tacks letter—which wasn't even entered—won the contest!

During World War II Brass Tackers bemoaned the loss of favorite writers to the war effort. But the end of the war became important for a number of reasons: it included the event which energized Brass Tackers like no other (not even the Apollo moon landings and the space shuttle disasters). The appearance of the atomic bomb produced a horde of scientific and political speculation, frightening predictions, and an irrefutable justification for those who read and love SF—nuclear weapons may have been news to the general population but SF fans knew of them long before. In fact, one of the most valuable BT contributions ever was by SF writer Theodore Sturgeon, who with much humor explained in December 1945 what SF readers get out of reading that "crap."

Since BT letters were often as entertaining as the rest of the magazine, and the letter-writers were unpaid, one might ask: Wouldn't it be cheaper to fill half the magazine with Brass Tacks? Surprisingly—in the 1940s, anyway—it apparently would *not* have been. Campbell mentioned in December 1943 that BT was considered "advertising matter" by the powers-that-be and taxed as such; it was more expensive to print than the stories!

Gradually *Astounding* matured; the stories became more sophisticated literarily and scientifically. BT matured too. Letters in the 1950s were often reasonable and interesting. Gone were the litany of "oh yeah? says you!" arguments. Not everyone approved, though. Alva Rogers, writing in *A Requiem for Astounding* (1964), described BT of the 1950s as "the dullest and least lively letter section in the science fiction field."

Beginning at this time—and continuing through today—more and more letters were sparked by the magazine's nonfiction. This was especially true of Campbell's editorials, which grew in size and profundity over the years. Consequently, some readers became very unhappy with Brass Tacks, and there were letters complaining about the lack of discussion of the stories. Campbell's response was, as usual, a practical one: he can't print what he doesn't get.

Particularly prominent during these years was Campbell's increasing emphasis on speculative science, which drew a considerable response from readers. In May 1950 an article appeared in *Astounding* by L. Ron Hubbard titled "Dianetics," which was the beginning of the controversial movement now generally called "Scientology." The article evoked 3000 letters, most of which were favorable, according to Campbell.

More such speculative—some would say "pseudo"—science followed. Throughout the 1950s and 60s there were plenty of articles and BT letters on extrasensory perception, dowsing, astrology, the Dean space drive, and a psi device called the Hieronymus machine. (There was surprisingly little about UFOs, except for a few letters that tried to link the Dean drive and these purportedly alien ships.) Some readers were delighted that the magazine was open to speculative ideas. Some letters suggested experiments, some made predictions; one letter, from astrologist Joseph F. Goodavage, predicted an epidemic in early 1964. (Fortunately for us, the stars and planets told a big fat lie on that one.) There were also interesting discussions from, for example, Norman L. Dean himself (one of whose letters, by the way, ends by noting "all rights are reserved").

Other readers were not amused. One of the most scathing letters appeared in October 1962 and was signed "J.J. Coupling"—the penname of John R. Pierce, a highly respected engineer and scientist who for many years was a research director of communications at Bell Labs and later a professor at the California Institute of Technology (and the man who coined the term "transistor"); Pierce also wrote SF (including a few stories which had been published by Campbell). "I don't find such vintage ideas as telepathy, telekinesis and the rest of the psi racket very exciting any more," he wrote. "I certainly don't get excited about alleged space drives that don't work. . . ." The letter ends thusly: "John, if you weren't so completely blind to the exciting achievements of [legitimate] science, I'll bet you could bring a lot of pleasure to your readers, many of whom are getting pretty tired of the same stale fare year after year." Campbell, in turn, accused Pierce of carelessness and emotionalism.

Spotting errors continued to be a favorite BT pastime. Two of the most prolific error-spotters were authors G. Harry Stine and Isaac Asimov. Stine once nailed Frank Kelly Freas for getting the color scheme wrong on an illustration of a Saturn-V launch vehicle. Asimov once pinned a geographical error on Campbell, but Asimov proceeded cautiously because Campbell was so slippery: "you are the most skillful man with a quibble

I have ever met," wrote Asimov, describing Campbell, "and I have no doubt you'll quibble your way out of this. In fact, I'm curious to see your answer to this letter, if you should happen to run it in Brass Tacks. About the only thing that would surprise me is if you ran simply 'Oops, my mistake!'" Campbell's response: "Oops! My mistake!"

The most important Brass Tacks contribution of all time was published during Campbell's era—and became so important, in fact, solely because of Campbell. The November 1948 BT had a letter by Richard A. Hoen, who lavished praise on the November *1949* issue. Hoen described the contents in detail, and it was definitely an all-star lineup, with stories by Asimov, Heinlein [Anson MacDonald], Don A. Stuart, van Vogt, Lester del Rey, L. Sprague de Camp, and Theodore Sturgeon. It was a good letter and a nice gag. But Campbell secretly decided to go one better.

When November 1949 came around, the real issue looked very much like the one described a year earlier by Hoen! Campbell had somehow managed to convince the very same authors to write stories with the same or similar titles as described by Hoen (there was no Stuart story, however). In his editorial, titled "Science-Fiction Prophecy," Campbell wrote: "Generally, a desirable, practicably attainable idea, suggested in prophecy, has a chance of forcing itself into reality by its very existence. Like, for example, this particular issue of *Astounding Science Fiction*." It was an astonishing feat, even getting a mention in the popular magazine *Time*.

Campbell's death was sadly marked in the November 1971 Brass Tacks. The first letter was by Isaac Asimov, who mourned the loss of "my literary father, the man who found and molded me." Other touching letters included one by Greg Bear, who at the time was about twenty years old and who expressed "hopes of being a writer"; Bear called Campbell "the finest, most dedicated editor science fiction has ever had" even

Chat online
with your favorite authors!

Bruce Sterling **May 25 @ 9:00 P.M. EST**
Sterling looks at *The Zenith Angle*.

Robert Silverberg **June 8 @ 9:00 P.M. EST**
The Science Fiction Writers of America's newest Grand Master reflects on his long career.

C.J. Cherryh **June 22 @ 9:00 P.M. EST**
Chat with her about her new book, *Forge of Heaven*.

Go to **www.scifi.com/chat** or link to the chats via our home page (**www.analogsf.com**). Chats are held in conjunction with *Asimov's* and the Sci-fi Channel and are moderated by *Asimov's* editor, Gardner Dozois.

though Campbell had rejected all of his stories.

The 1970s and Beyond

The editors who followed Campbell—first Bova and then Schmidt—continued Campbell's tradition of writing provocative editorials and publishing speculative science articles, much of which generated considerable mail. For example, October 1974—the "Special Velikovsky Issue"—explored Velikovsky's controversial astronomical theories.

But the fiction has produced its share of letters too. In the last few decades *Analog* has published a number of stories that struck a nerve, touched a heart, or—considering *Analog*'s contentious readership—quite often stirred up a goodly quantity of bile. Fault-finders and error-spotters have also continued to be ever at the ready, so much so that one idealistic reader complained, "Nit-picking fuss-budgets and blue-nosed prudes are not my kind of people . . . Shouldn't we fans, as a group, be tolerant, open-minded, imaginative, free-thinking, future-oriented types?"

Some of the best letters don't so much criticize as ask interesting questions. One of the finest stories ever published in *Analog* is Zelazny's "Home is the Hangman," where a powerful android called Hangman apparently becomes uncontrollable and begins hunting down its creators. One reader wondered why Zelazny named the character Hangman—which wasn't explained in the story but probably should have been. Zelazny offered this suggestion: "How about Human Analog Nuclear Generator Mobile Analysis Nexus?"

Controversies, as always, continued to be played out in Brass Tacks. Bova wrote, "It's a rare day when the Editor isn't accused of being Communist, Fascist, Atheist, Clerical and anti-Italian—simultaneously." But the editor wasn't always the target, nor were the writers. In October 1973 Poul Anderson used BT to complain about the judge's choice for the John W. Campbell Memorial Award that year: Barry Malzberg's *Beyond Apollo*. The judges were supposed to choose a novel that they felt merited special recognition, but Anderson claimed that in this case their choice didn't reflect Campbell's tastes. Anderson's criticism generated a heated discussion, both pro and con. (In a November 1996 BT letter, Anderson admitted that, overall, Campbell probably would have approved of the list of Campbell Award winners: ". . . the trend is no longer anti-Campbellian, and has not been for a considerable time—if, indeed, it ever was.")

Brass Tacks has also gotten interesting letters from Ed Nogo, E.L. Picktwaddle, and Ambrose Bierce (whose address was "somewhere in Mexico"). Those letters appeared in Kelvin Throop's Spoof Issue, mid-December 1984.

And BT has continued to get letters written by people who later became well known for their stories or articles. Recent examples include Henry (H.G.) Stratmann (July 1992), Richard A. Lovett (June 1993), Michael A. Burstein (January 1994), and Fran Van Cleave (December 1996).

But one of the most notable events of late has been purely technological. The development of the Internet has provided a much more rapid forum than a traditional letter column published on paper. Indeed, the Internet discussion boards are practically instantaneous, which handily beats the lengthy delay caused by a paper magazine's publishing and distribution process. *Analog* has a forum at its website, www.analogsf.com, and plenty of readers participate and enjoy it. Which begs a question: Does Brass Tacks have a future?

My opinion: Yes, Brass Tacks will survive.

The web forum has clear advantages: speed, as I mentioned before, and limitless space. But there are disadvantages, too. Limitless space, for one. Or, more precisely, a lack of moderation. The discussions or "threads" are sometimes interesting in the beginning but almost invariably mutate, discursively visiting numerous topics which have nothing to do with the original. The web forum has more of the feel of a conversation, with its simultaneity, spontaneity, frequent disruptions, and lots and lots of noise. It's a splendid place to drop by for a chat, but the signal to noise ratio is, in terms of *reading* material, appallingly low.

Brass Tacks, on the other hand, is a selection. Those of you who know something about "slush piles"—and those of you who try to wade through the huge number of posts on the web forum—know quite well the benefits of having a thing called an "editor." It's an evil thing, perhaps, but a necessary one: someone's got to whittle down the incredible volume of submissions to what is in the editor's opinion the most likely to be of interest to at least a substantial fraction of readers. Brass Tacks will continue to provide an entertaining and valuable department, publishing letters that deserve to be a *part* of the magazine. It's the readers' contribution, reflecting their thoughts, criticisms, speculations, brickbats and bouquets.

One could, however, envision a new department in the magazine: a selection or summary of web forum material. The filtered version of the forum would fit into the small space available in the magazine and would include (in the summarizer's opinion) the most valuable—or at least the most representative—contributions.

But whatever changes in media or publishing that the future holds, the most important thing about this or any other magazine is the contents. Asimov said as much in his 1935 letter: "I buy the magazine for what's in it and nothing else."

In a letter published in November 1930, a reader expressed the hope to read *Astounding* "for the remainder of my life." As it turned out, it's the one SF magazine that he could have done so, even if he had a very long life indeed. And it's the readers that Harry Bates was referring to when he reflected on the magazine's history: "Know that it was you of the thirty millions of words who made *Astounding* a thing of wonder."■

IN TIMES TO COME

Our September issue, through a series of purely fortuitous coincidences, could be considered our "Variations on Mars" issue. In addition to Part 2 of Mary A. Turzillo's novel *An Old-Fashioned Martian Girl*, we have two quite different visions of Mars by other authors. One is "Trophies and Treasures," by Jerry Oltion and Amy Axt Hanson; would you believe a cross-country camel race among the British aristocracy on Mars? And then there's "The First Martian," wherein promising newcomer Joe Schembrie shows a quite different kind of heroic pioneer.

It's not *all* about Mars, of course. Rajnar Vajra's "Viewschool" is well-timed for the beginning of the school year, with its vision of the challenges of a new kind of teaching. And Stephen L. Gillett, Ph.D., long one of our favorite science fact writers, returns after too long an absence from our pages with "The Fifth Biorevolution." You can probably guess who has the starring role, but the jury is still out on the relative proportions of heroism and villainy.

Neutrino News: SNO, KamLAND, and WMAP

The neutrino is one of nature's most peculiar particles. It has 1/2 unit of spin but no electric charge, a near-zero rest-mass, and it interacts with other particles only through gravity and the weak interaction. It can pass through light years of lead without an interaction. There is good experimental evidence that the Earth receives only about 1/3 of the neutrinos that the Sun should be producing and sending in our direction.

I've written several previous columns about neutrinos. One discussed the then-current evidence for a neutrino with a huge 17 keV rest-mass (see *Analog*, December, 1991). Several other columns considered the possibility that the electron neutrino might have an imaginary rest-mass characteristic of faster-than-light tachyon particles (see *Analog*, September, 1992 and October, 1993). I will start this column by saying that from new experimental results, it is now clear that neutrinos do *not* have a 17 keV mass (that was a detector artifact) and are *not* tachyons (that was a subtle artifact of the physics and chemistry of the tritium sources used). We now understand much more about neutrinos, and this column will present some of that understanding.

Let me start by reviewing the Standard Model of particle physics as it applies to neutrinos. There are two classes of fundamental spin 1/2 particles, the strongly-interacting quarks and the weakly-interacting leptons. Three of the leptons (e, μ, and τ) have significant masses, and all three have the same electric charge. The other three leptons (ν_e, ν_μ, and ν_τ) have zero charge and are called neutrinos. The simplest form of the Standard Model assumes that neutrinos, like photons and gluons, have zero rest-mass. However, we have had to change that assumption, based on new experimental evidence. Neutrinos have *very small* masses (probably a few hundredths of an electron-volt), they usually travel at nearly (but not quite) the speed of light, and they rarely interact with anything.

Our sun is a giant thermonuclear reactor that burns hydrogen into helium, making lots of neutrinos in the process. You can think of the Sun's thermonuclear reaction as applying heat and pressure that forces hydrogen nuclei to "eat" their orbiting electron and change their charges to become neutrons, spitting out the neutrino "lepton seeds" that are left over. About 61 billion neutrinos per second made in the Sun pass through each square centimeter of area on the surface of the Earth. If your body presents an area to the sum of a square meter, this means that 610 trillion neutrinos are passing right through your body in the second it takes to read this line. But you don't notice this because there are no interactions.

Neutrinos pass through your body and through the Earth as if neither was there. As you might imagine, this makes neutrinos very difficult to detect . . . but not impossible. Over the last quarter of the twentieth century, a succession of

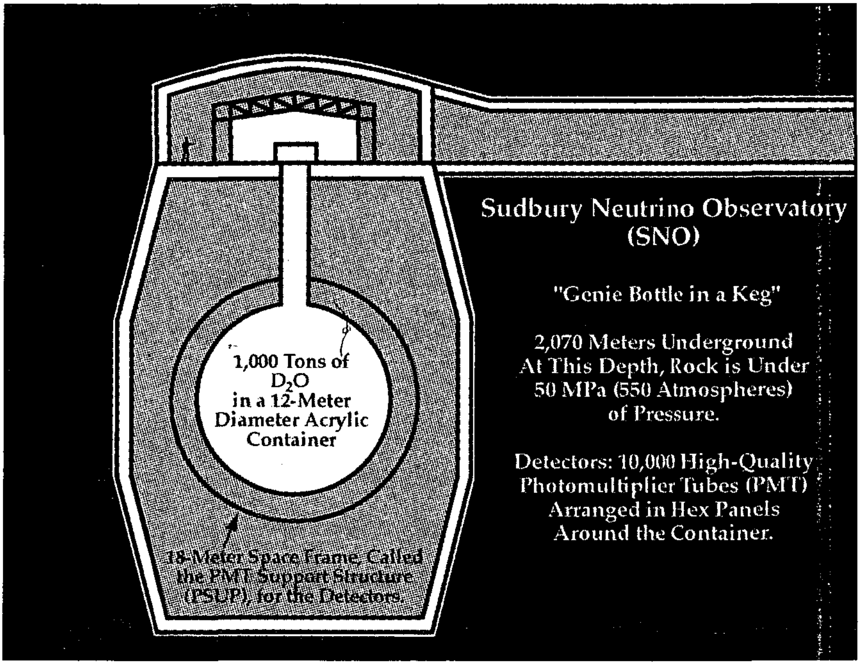

Sudbury Neutrino Observatory (SNO)
"Genie Bottle in a Keg"
2,070 Meters Underground At This Depth, Rock is Under 50 MPa (550 Atmospheres) of Pressure.
Detectors: 10,000 High-Quality Photomultiplier Tubes (PMT) Arranged in Hex Panels Around the Container.
1,000 Tons of D2O in a 12-Meter Diameter Acrylic Container
18-Meter Space Frame, Called the PMT Support Structure (PSUP), for the Detectors.

Illustration by Wolf Read

large underground neutrino detectors has demonstrated that (a) the neutrinos from the Sun *can* be detected and that (b) there is a discrepancy of a factor of three between the number of neutrinos predicted by astrophysical theories and the number of neutrinos actually detected. This is known as the Solar Neutrino Problem. At the end of the twentieth century, it was number five on my list of the top ten things that we do not understand about physics (see *Analog*, July/August, 1999). However, in the past few years, important new information about neutrinos has come from observations by the SNO, KamLAND and WMAP detectors, and the Solar Neutrino Problem has essentially been solved.

SNO
(Sudbury Neutrino Observatory)

Some years ago, the Canadian government began a program for developing and selling nuclear power reactors, called CANDU reactors. These were fueled with natural uranium and moderated with "heavy water," that is, with water made with deuterium instead of hydrogen. This made economic sense, because Canada had lots of natural uranium and a great deal of hydroelectric power, and during off-peak times this surplus electricity could be used to separate deuterium from hydrogen by electrolysis to make heavy water. However, after the market for nuclear power reactors diminished because of misguided environmentalism and after India used a CANDU reactor in developing its nuclear bomb, sales of the CANDU units dried up and Canada was left with a sizable quantity of surplus heavy water.

Physicists are opportunists. The large reservoir of Canadian heavy water represented an experimental opportunity that could not be overlooked. After years of proposal writing and some delicate negotiations between the US and Canadian governments, a consortium of US and Canadian physicists built the SNO detector (Sudbury Neutrino Observatory), a large acrylic vessel filled with $300,000,000 worth of Canadian heavy water and housed miles deep in a mine in Sudbury, Ontario. The acrylic vessel is suspended in a tank of normal water and surrounded by photomultiplier tubes that record light flashes from the vessel.

When neutrinos pass through heavy water; they can interact in several ways. In the first process, which is called a "charged-current interaction," the incoming neutrino can convert the deuterium nucleus into two protons and an electron. Essentially, a neutron and neutrino change charges through a W boson to become a proton and electron. The electron carries off most of the original neutrino's energy and will make a flash of Cerenkov light in the heavy water.

In the second process, which is called a "neutral-current interaction," the incoming neutrino breaks up the deuterium nucleus into a proton and a neutron. Essentially, a neutron and neutrino interact through a Z boson. The neutron subsequently is captured by another nucleus, producing a gamma ray that can be detected from the flash of Cerenkov light by a photo-electron.

In the third process, which is called a "neutrino elastic scattering," the incoming neutrino bounces off the electron of a deuterium atom. Here, the electron and neutrino interact through a either a Z or W boson. The electron carries off part of the neutrino's energy and will make a flash of Cerenkov light in the heavy water. These three types of interactions generate somewhat different signals and are distinguishable in the SNO detector.

The SNO detector is selectively sensitive to electron neutrinos (ν_ε) through the charged-current interactions, and is unselectively sensitive to all three neutrino species (ν_ε, ν_μ, and ν_τ), through the neutral and elastic interactions. Therefore, if the missing 2/3 of the neutrinos from the Sun are absent because they have "oscillated" from ν_ε to ν_μ and ν_τ, they should contribute to the neutral and elastic interactions, but not the charged-current interactions.

And sure enough, when the SNO data was analyzed, the solar neutrinos missing in the charged-current interactions turned up in the neutral and elastic interactions. The Solar Neutrino Problem occurs because all three neutrino species have small and slightly different rest-masses. As they propagate through space, the small mass differences modify the quantum interference between species, and ν_ε are transformed into ν_μ and ν_τ (and back again). Before SNO operated, there were several alternative theories for how neutrinos might oscillate. The SNO results are consistent with only one of these theories, the so-called LMA (Large Mixing Angle) solution, and indicate that the electron neutrinos are oscillating into another neutrino species (presumably ν_μ) that has a difference in mass-squareds $|m_e^2 - m_\mu^2|$ of 8×10^{-5} electron-volts^2.

KamLAND (Kamioka Liquid-scintillator Anti-Neutrino Detector)

The neutrinos detected by SNO travel 150 million kilometers, so there is a very long path length over which the oscillations between neutrino species can occur. Rather surprisingly, the SNO data suggests that the path distance over which significant neutrino oscillations occur is fairly short, only a few hundred kilometers.

This rather short oscillation length has been tested by the KamLAND experiment conducted in Japan. In the old Kamioka cavity inside a Japanese mountain, where the predecessor of the SuperKamiokande detector was housed, a new detector has been built, a stainless-steel tank containing a spherical balloon holding one kiloton of liquid scintillator. About 180 km from the Kamiokande site are several Japanese nuclear power reactors. In the nuclear fission process that occurs in these reactors, neutron-rich fission-fragment nuclei are produced, and these undergo radioactive decays in which the excess neutrons are converted to protons, emitting an electron and an anti-neutrino in the process. KamLAND is designed to detect these anti-neutrinos as they convert protons in the detector into a neutron and a positron. The signal of such an anti-neutrino event is the detection of gamma rays from the positron annihilation, followed by the detection of a 2.2-MeV gamma ray from the capture of the neutron by hydrogen.

The KamLAND detector will continue to operate for some time with improving statistics, but in the initial period of its operation the consortium has reported evidence for neutrino oscillations consistent with the LMA solution, with a difference in mass-squareds $|m_e^2 - m_\mu^2|$ of about 7 x 10^{-5} electron-volts^2. Thus, neutrino oscillations have been detected for both neutrinos from the Sun and anti-neutrinos from nuclear power reactors and give consistent results.

WMAP (Wilkinson Microwave Anisotropy Probe)

The problem with the new SNO and KamLAND results is that they measure $|m_e^2 - m_\mu^2|$ rather than m_e and m_μ. In a column published in the October 2003 issue of *Analog* I described the results of the WMAP satellite probe, which mapped the small angle fluctuations of the cosmic microwave background, the reverberating "sound of the Big Bang" when our universe was about 380,000 years old.

It turns out that the WMAP data also has something to say about the rest-mass of neutrino species. This is because massive neutrinos fall into the general cosmological category of "hot dark matter," which tends to smear out the "clumpiness" of the early universe. The WMAP data, because it views this initial clumpiness, places fairly stringent limits on how much hot dark matter could have existed in the early universe. The data indicate that the mass density of neutrinos in the universe cannot be larger than about 2% of critical density. This translates to 1.0 electron-volts as the sum of the rest-masses of all three neutrino species.

Assuming that the electron neutrino (ν_ε) is no more massive than the other two neutrino types, this result limits its mass to no more than 0.33 electron-volts. This is to be compared with laboratory measurements of tritium beta decay, which place a corresponding upper limit of 2.2 electron-volts. Thus, cosmology has beaten laboratory physics in placing a limit on the rest-mass of the electron neutrino by almost an order of magnitude.

Conclusion

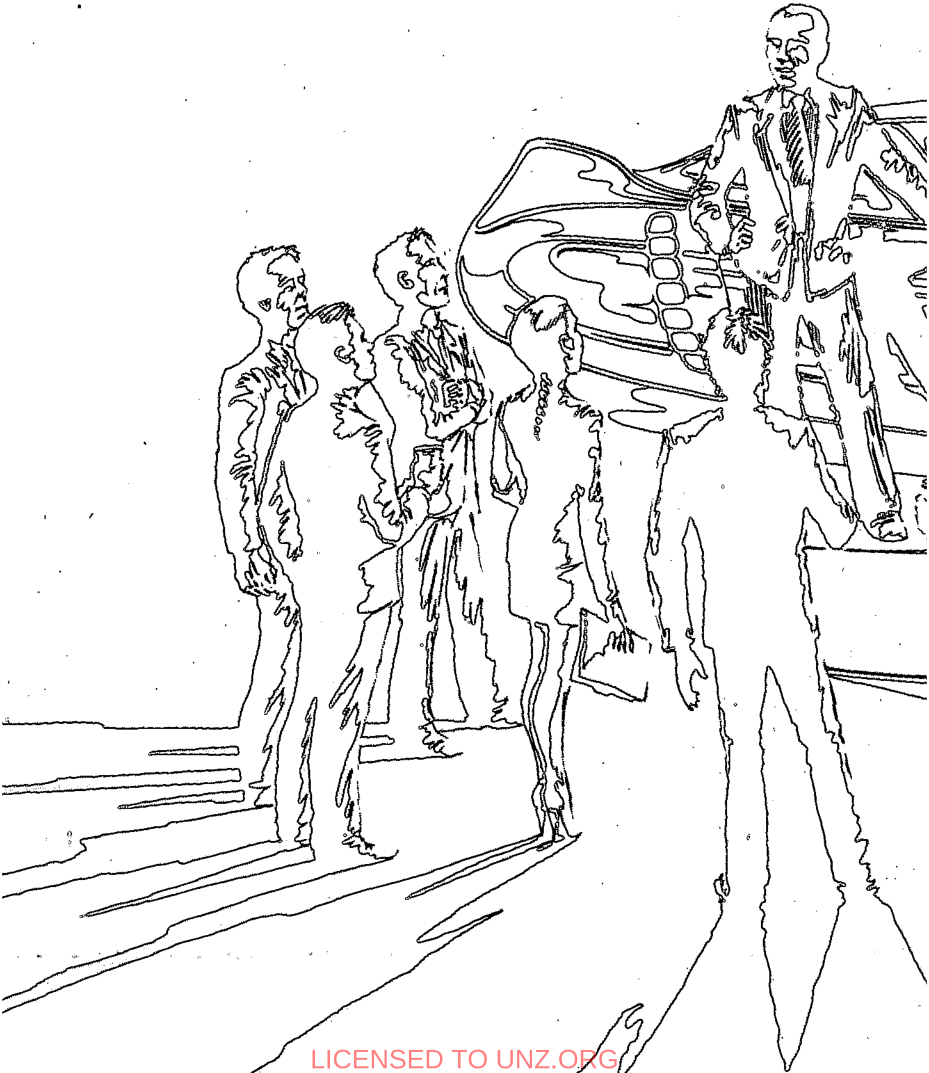
The results from SNO, KamLAND, and WMAP are not the final word on neutrino physics, but they have answered some outstanding questions. We know that about 2/3 of the neutrinos reaching the Earth from the Sun are in the form of ν_μ or ν_τ. We know that neutrinos are *not* tachyons and have positive mass-squared values with differences that suggest (but do not prove) that the masses are around 0.01 electron-volts. We know from WMAP that in no case can the electron neutrino have more mass than around 0.33 electron-volts. We also know that about 93% of the universe's mass-energy is in the form of some mysterious dark energy and cold dark matter, with only 7% left for ordinary matter including neutrinos. We now know that we live in a very peculiar universe.

Reference:

Neutrino Physics

"Neutrino Physics: an Update," Wick C. Haxton and Barry R. Holstein, *American Journal of Physics* 72, 18-24 (2004), preprint hep-ph/0306282. ■

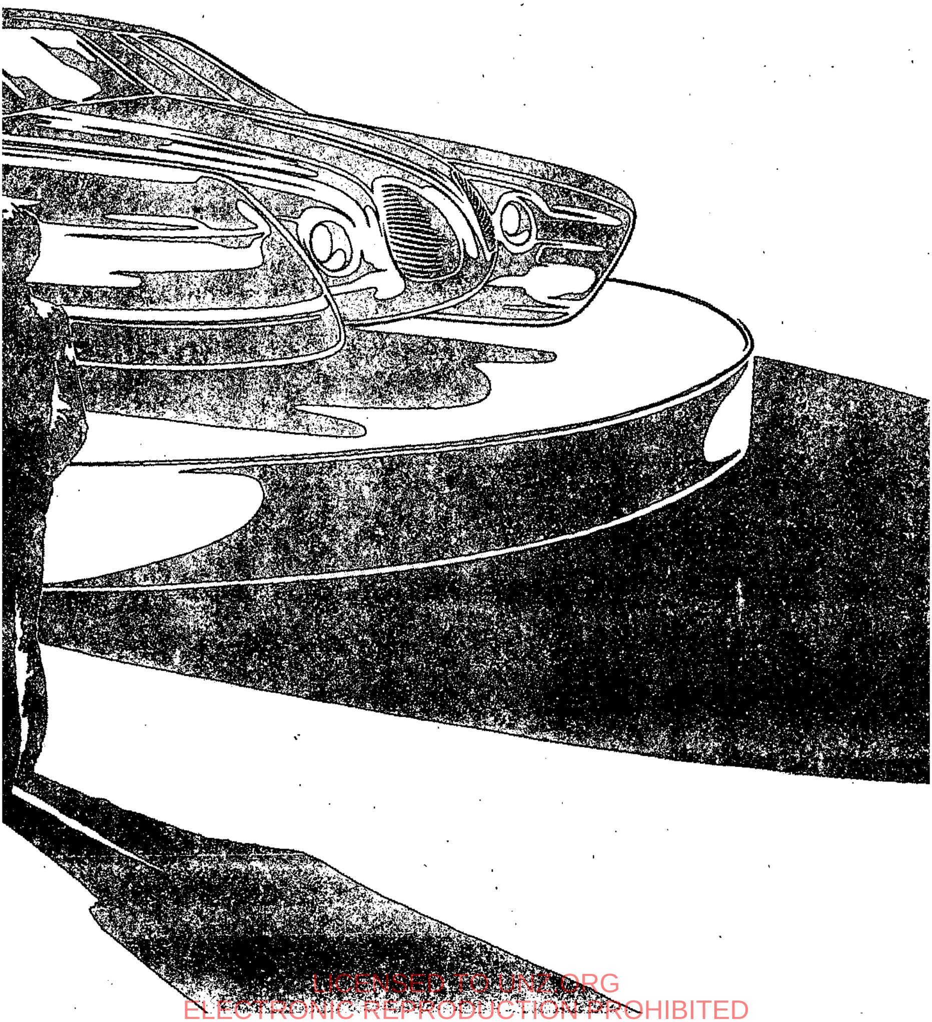
Fool Efficient



Bob Buckley

Illustration by John Allemand

Truth and belief
have some strange relationships. . . .



At precisely 7:46 AM Claire buzzed him, "Don't forget your ten o'clock with the new domestic sales team. You scheduled the kickoff session for this morning."

He hadn't forgotten; he'd thought of nothing else for most of the week, and all of last night. "How's attendance? Everyone show up that was on my list?"

"All but Warren Seielstadt. He sent a junior marcomm specialist in his place."

"Damn!" Maestri frowned. This was an unexpected disappointment. His gaze drifted off Claire's color image on the commset's screen to the glass window wall that surrounded him on three sides. The reflection of the sleek, sixty-story needle of the MX TekWay headquarters building showed boldly across multiple high rises, resembling a starship barricaded within a maze of boxy, earthbound obstacles. Obstacles like Seielstadt. Recruiting the man had been a calculated gamble. Maestri needed an automotive insider with valuable relationships, and since he hadn't been able to openly hire a suitable candidate, he had decided to steal one. Now Detroit would remain *the* hard nut to crack, even more so than Japan.

"What's his name?"

Claire grinned at him happily on the little screen, showing even, white teeth, "It's a she. Melissa Addison."

"I don't know her."

"I do. She's good."

"Tough luck for Seielstadt. Notify HR that Ms. Addison will be assuming marketing direction for the northeast campaign. Offer Seielstadt our standard exit package."

"He's a VP. He'll be upset. He'll make it expensive to cut him loose."

"I expect so, considering how costly it was just to lure him onboard. But, with a mixed bag of loyalties, he'll be more a danger to us than an asset. We'll write this off to experience and pay up now, instead of later."

"Will you want me to sit in and take down action items?" Another grin, "For moral support. This *is* your first face-to-face with them."

Her shoulder-length reddish hair moved in a very appealing fashion as she tilted her head back to catch his eye. He had hired her four weeks ago as his personal assistant. Apparently, she had started to like him, because now, she seemed to be signaling that he had her loyalty. That realization made him feel just a little guilty.

"Thanks, but it's not that kind of meeting, just a stand-up around the prototype, so they can see it for the first time and ask questions."

She nodded, her face showing no more than a quick flicker of disappointment as he broke the connection. His heart rate was up slightly. For a native, Claire was very attractive. But, this was no time to start getting close to anyone. He glanced at the small mirror resting on his otherwise starkly bare desk. It reflected a pale, somewhat stern face, of indeterminate age, sharp-featured, like something hacked hastily out of hardwood with a hatchet. Not the kind of a face females typically found attractive. But it was powerful, a face males would respect and follow. Once again, PsiComp had applied data from their advance fieldwork and designed well.

He remembered how nervous he had been on his first operation. Experience had eased that. Experience, and a long string of nearly bloodless successes. How many solo campaigns did this make? He'd lost track, but many of his contemporaries had long ago grown weary of the strains of advance work and petitioned for transfer to something less stressful. Like tactical weapons disposal, he reflected with grim humor. Okay, his was an unpopular avocation. But it was more productive than the old bash-and-burn technique. Which was still an option. Should he fail, he knew the yet-to-arrive battle group would not. So, for the sake of this new bunch, he had to stay cool and smart, and focus totally, radiating unflappable confidence.

He practiced a quick smile . . . no, not that, he looked like a predatory *bsif.* Maestri forced himself to relax, then tried the smile again. Yes, better! Nodding, he locked in the expression. Sincerity was key, these people weren't fools.

He stood up, took a long, deep breath . . . and immediately wrinkled the Everest-like air intake that anchored his facial features. That chemical stink from the office carpeting was foul! How did these people stand it? He mentally elevated his senses above the alien reek, then smiled again, taking his time doing it. It was going to be a good day. He had a great product. His agents had recruited the best marketers they could find on short notice. And tomorrow, he'd have some decent natural fiber floor coverings put down, and have all this mass-produced poison ripped out.

Out in the hall, Maestri readjusted the carefully formed knot of his tie. It had been a tricky thing to learn, but necessary. These creatures seemed to relish having a symbolic noose around their necks. Finally, like a general launching the first raid of a long-planned campaign, he stormed the executive elevator and rode it down alone to the showroom.

"Gentlemen, and Miss Addison . . ." He made it a point to give the young woman a knowing smile, which she returned uncertainly—not yet having heard of her good fortune. "Thanks to all of you for coming, despite your full schedules. Once we're into the meeting, I think you'll all be very glad that you attended. This will not be time wasted."

They were all clutching morning coffees, and were standing in a loose circle around the raised center pedestal. These were his sales managers for all of the crucial sales territories: Southern California, the Northwest, the Midwest, the Northeast, the South, and Florida. Behind him, Phoenix dominated the showroom, sleek and black, projecting an image of raw power and to-die-for luxury on whisper-thin, streamlined parking skids. Even standing still, it flew faster than the imagination.

He gave the low-slung vehicle a casual introductory wave, letting the understated gesture emphasize the revolutionary nature of the product.

"Welcome to the future of global transportation." Then, he winked, giving them a conspiratorial grin. "Must be the first time you've heard that, right?"

Most of them smiled back. Marketing flak was just that—flak.

"Well, this time, it's true. Trust me." He let them laugh again, cementing the emotional bond he was striving to build. "Miss Addison, I sense that you have a certain anxiety about the design. You first."

She blushed prettily as everyone's attention focused on her. "Well . . . it's just that . . . well, it doesn't have any wheels."

He smacked himself in the forehead. "Did we forget those again?"

The laughter was louder this time. Maestri waited a precisely calculated moment, then put a hand on the flank of his creation, their product, and his expression brought them to silence.

"From this day on, wheels are obsolete. Phoenix glides on a cushion of high-resonance, magnetic force.

The effect extends about a foot above smooth pavement. For off road use, this can be adjusted to two and a half feet."

Florida's hand shot up. "Okay, dumb question. How do you stop something that's frictionless?"

"First, *it* is the Phoenix. Keep that in mind. Say it, sleep it, keep it before you always. Make people marry the name and image together. Other models and brands will follow, but Phoenix is how we intend to introduce this technology to the public, as a symbol of rebirth and transformation. You, through this technology, are going to transform how the world moves." He paused, studying them, gauging reactions. Florida didn't know what he thought, yet. Southern California, being naturally cynical, was unconvinced. All the others were firmly on the fence. California would be the crucial buy-in. His district encompassed the influential leading edge of the automotive public. If the So Cal driver didn't like a product, it was dead, no matter how revolutionary the innovation.

In spite of this, he decided to work Florida first. "Excellent question. Without effective brakes, frictionless drive would be as deadly to its passengers as it would be to passersby, like a loose bar of soap in the shower." They grinned obediently. It was his meeting and he could get away with lame humor. "Phoenix field technology actually provides more control than a conventional wheeled vehicle. Magdrive both repels and attracts. It is precise and simple in application. And there are significant savings in not having to purchase tires, stylish wheels . . . or hydrocarbon-based fuel."

California blinked at that, and his interest level shot up dramatically. The lifeblood of his state was gasoline, at an exorbitant $4.50 a gallon. He raised an eyebrow and Maestri nodded at him.

"It gets good gas mileage?"

"Excellent. Doesn't use any."

"You mean, it's got fuel cells?"

"Not a one."

A cynical grin spread over the tanned features. "So what makes it go? Sea water?

"Well, there are engines in existence designed to exploit a ready supply of explosive hydrogen. But I wouldn't like to be in one with today's drivers." That got him a room full of smiles, and the barriers of restraint crumbled for good. Excellent.

"Phoenix utilizes the most basic energy source there is, a source that is ever-present, cannot be depleted, not even within a billion of our lifetimes. And, best of all, it is totally, utterly free."

Miss Addison was frowning in concentration.

"You mean air?"

"Well, air *is* free . . . for now." He touched the remote secreted in his pocket and the pedestal TV next to Phoenix came on. Without cable or antenna attachment, what appeared on the screen was snow: a buzzing, churning storm of raw, random noise. "What you are seeing is the oldest fossil in existence, the background radiation left over from the Big Bang that created our universe. It is this vast reservoir of low-level energy that powers Phoenix."

That stopped them dead, even Southern California. "Static?" he repeated in open amazement.

"Background radiation," Maestri corrected. "It's universal. It's everywhere. All you have to do is collect it."

The tanned features wrinkled up incredulously. "Universal static? This is your revolution?"

He'd pushed them too far, too fast, Maestri realized with a sinking feeling. He'd strained their credulity to the breaking point. An uncertain silence claimed the large room.

Then, unexpectedly, Midwest saved him when he asked in dead earnest, "How many colors does it come in?"

Maestri sighed in relief.

"You can have any color you want, as long as it's black."

Southern California, who had been sipping coffee, exploded, spraying those unfortunate enough to be standing near him with a mist of latté decaf.

"The outer skin of the Phoenix is a very sensitive total absorption antenna. White reflects, and other colors contain white, in varying amounts, so we don't use them. We can't. Also, the outer skin is electrostatically charged to repel dust, mud, water, suicidal insects and the like, so the antenna can maintain maximum reception at all times."

"There goes the freelance detailer's livelihood," Southern California hissed to Miss Addison in a stage whisper, as he blotted his jacket with his tie.

Florida's hand shot up. Maestri nodded at him.

"A black car that never needs gas, obsoletes the internal combustion engine, and has no tires? If this catches on we'll bankrupt half of the existing industries in the country. We're gonna get shot."

"Hopefully not, but it's definitely revolutionary," Maestri agreed. "One might even call Phoenix a weapon, since each order filled will be like an unsheathed sword striking against a stagnated industry, forcing change. But, keep this in mind, change is not necessarily bad. If we didn't make Phoenix, or something like it, eventually someone else would. So, the real question is, will you sell it? Can you sell it?"

They all gazed at him fearfully, like he was the devil holding out a sack for their souls. But the gleam in their eyes was decidedly hungry.

"When do I get a demo?" Southern California wanted to know.

"We're working on that. The assembly process is fully automated, and the quality isn't quite where we want it, yet." That was a lie. Actually, his first shipment was all over the bottom of the Pacific, due to a malfunctioning guidance computer on the first heavy transport. Unfortunately, the second had yet to clear the jump point, and it still had a long trip in-system once it arrived.

"Soon," Maestri promised vaguely.

The remainder of the meeting was spent going over the internal features. There was a lot of built-in luxury, like leather, sat-nav, entertainment units, a sea of cup holders, and burlwood trim. They marveled that the only thing under the hood was a small, permanently sealed ovoid of mirror-bright metal. Even Miss Addison rolled up her lace-trimmed sleeves and got her hair out of place and her hands dirty peering at the underpanels. By the end of the session, Maestri felt he had six wholly committed believers. He bid them good luck and good hunting, and rode the elevator back up to his office, drained and empty. He sent Claire home for the rest of the day and watched the Sun go down behind cloud-scraping walls of steel and glass. Skipping dinner, he just sat in the dark and watched the lights in the surrounding buildings blink off, until only a battered moon and a dusting of stars lit the night.

Back home, they called him The Fisherman. He liked the label. That was how he worked. He baited his hooks and tossed them out into likely-looking holes. It was the waiting that was the hard part. As a long-dead force advisor had once reflected, "Any campaign, anywhere, is 5 percent stark terror, and 95 percent polishing your kit."

The next week went by quietly. No requests for pre-orders arrived, and the comm lines remained silent. When Southern California called it was only to demand a showroom demo. After hemming a bit, Maestri promised that he would have his sole non-working, display unit boxed and trucked out to California. It was all he could do.

Maestri stayed glued to his desk, eating the occasional vending-machine sandwich dutifully placed in his pristinely barren in-basket by Claire, and stared out the big windows, watching the Sun move slowly over the reflective facades of the surrounding high-rises, marking the hours. By night, the eternal stars wheeled relentlessly above.

He gave Claire daily news releases to feed to the business wire services.

Then, one night, a new constellation formed, hot little pinpricks of light that burned aggressively no more than a few degrees off the North Star.

Another week passed. Still no orders. And in the night, more stars. But not his transport. If Maestri's biology had allowed stomach ulcers, he would have surely developed some, just for something to do.

When Claire buzzed him to let him know that a Stri Waldner was on line one, he was almost relieved.

"He says he's a force advisor, whatever that is."

"I was expecting him to get in touch when he got in the area."

"So what's a force advisor?"

"The armored complement to my velvet glove."

Her expression went from curiosity to annoyance. "I don't understand."

"I'm glad. Just put him on. And no eavesdropping."

"I never . . ." she protested.

Maestri shook a finger at the camera pickup and activated the speaker on the desk phone.

"My old friend. We're now on station above you, ready to assist." Waldner's voice was strong, with just a hint of brittleness. "When I heard they'd given you the new territory . . . well, I was surprised. My officers and I thought you were dead."

Maestri frowned. "Stri, how are you? No, I'm not dead, just busy."

The face on the little screen wore several new scars. And the shock of gray-black hair was still combed into a crest fashionable back when they had both been boys. "So, how's the weather down there?"

"There isn't much at the moment."

"A pity. I *could* make it rain."

"I'd rather avoid your kind of showers. My last posting was the reclamation of Metterwich. The fleet pacified the place before an advance operative could go in."

"Yeah, that *was* an ugly one." The voice turned defensive, "Not one of mine. But, when the native civilization proves unreasonable. . . ."

"You can't fault them for trying to retain their freedom."

The voice on the other end of the link made amused noises. "Maestri, you've gone liberal. I always knew you would mellow with age."

"Assume otherwise. What's your tactic this time?"

"Well, since this is a water world, we'll begin by creating undersea disturbances along the continental shallows to initiate sudden and massive clathrate releases. Computer projections predict major collateral die-off in conjunction with severe global warming."

"Subtle, as usual. There'll be nothing left down here more sophisticated than green algae and lichens. You'll kick the entire planet into an ice age."

"Granted, it'll be hard on the lifeforms, but most of the structures and resources will remain intact."

"Stri, I won't be a party to genocide. You stay off my planet until I've completed my work!"

Quiet laughter rumbled. "Old friend, you may not like the new technology, but it's more effective than this hands-off dabbling that you practice. Conserves valuable resources and if the natives don't get blown to bits a few even adapt and survive. The result is vastly improved slave stock, and the Directorate has been delighted with our results. Something you're short of. I've been monitoring the entertainment channels down there and I don't see anything happening. This is a results-driven campaign, Maestri, not a rest station for aging acquisition operatives. I'm giving you twelve local planetary days. By day thirteen, if you haven't started getting results, I'll initiate *my* plan. There, you've been advised per the articles of assimilation. My obligation has been fulfilled. Good hunting, old friend."

Maestri killed the line with an angry jab of his thumb and for a good ten minutes afterwards he paced the office, shaking with fury. When Claire came in and saw him she went white.

"Should I call 911?"

"What?"

"Don't snap! You look like you're about to have a stroke."

He made himself return to his chair and sit down.

"I don't plan on having a stroke," he told her, biting off each word.

"Okay, fine. Just the same, I'm getting you a cup of ice water and a lot of aspirin. You're a good boss and I really hate going to funerals." She gave him a quick smile, waiting to see if he would grin back.

He did.

"I need something with a bigger kick than water."

Claire nodded. "Thought you might. Wait." She vanished into the executive kitchen.

When she returned, she had a heavy bottle of something that was smooth as silk and very strong. He put two glasses on the desk and motioned for her to join him. She poured, then retreated to the sofa against the far wall. As he sipped, he felt Claire gazing at him from across the room, her eyes exploring him as if he was a mystery to be deciphered.

"Do you want to talk about it?" she asked finally.

"No," he growled. "There's nothing you can do."

"From your expression, it looks very life-and-death," She was beginning to show the effects of the liquor.

"Yes, but for you, not me. I don't die." He swirled the thick liquor in the massive carved glass, watching the light dance in the facets. "That's never part of the plan."

"Some plan," he heard her murmur. Then, rather surprisingly, she was in his arms.

The perfect operative/native assistant relationship excludes intimacy. The assimilation handbook was specific about this point. But as the antenna-clad summits of the surrounding high-rises began to glow at the touch of a new day, Maestri wondered if the handbook was still relevant to him. His right arm was as numb as deadwood under the weight of the sleeping Claire, but he did not feel like moving. He felt trapped, though not by this woman. Trapped by questions.

Why did the Directorate need so many worlds? Why were independent intelligences considered so dangerous that they had to be stamped out, or quickly brought under Directorate control?

His head throbbed. Such traitorous thoughts. It must be this powerful native liquor.

He shook Claire awake.

She yawned and tried to give him a kiss, but he pulled away.

"No, last night was wonderful, but no more," he told her gently, but firmly.

Her face reddened. "Was something...?"

"No." He smiled and took her face in his hands. "I just don't want to spoil what was an extremely pleasurable moment."

"Pleasurable?" she repeated, blinking in surprise. With her hair mussed, her clothes in loose disarray, Claire was compellingly warm, visibly accessible, delightfully fragrant and erotic, and Maestri found himself wanting to crush her in his arms, to claim her completely. And not simply as spoils of war, one more native female to be used for fun and discarded. Claire was loyal and intelligent, and he genuinely liked her. And for that reason that he made himself get up and guide her out of the office, telling her to go home and take the rest of the day off.

The look she gave him was a mixture of wounded pride and astonishment. He nearly went to the door to call her back. Almost. He took a deep breath and steeled himself. A professional had to make sacrifices. There was no time for personal adventures on a campaign, not with just twelve days to deliver a world.

Back at the desk, he called each of his district sales managers personally. He listened, he questioned, he struggled to understand. A revolution in transportation should be taking place. Money should be changing hands and long waiting lists should have been compiled by now. It was like there was some subtle conceptual wall standing between Phoenix and its acceptance by its public. What crucial, but hidden, cultural aspect of this civilization had he missed?

Southern California was angry.

"Look, Maestri, you want orders, you

give me some hardware to build interest. Get me something that the editors of automobile magazines can test-drive. I need photo essays on Phoenix style and performance in *Track and Road Monthly*. I want copies of a product comparison in the latest issue of *Car Talk* that I can stack in the showroom."

Maestri hedged, and danced, and promised. By the time he finally rang off, he was drenched in cold sweat. Where was that damned backup transport?

The following day, just before lunch, a frosty Claire announced that he had a caller.

Stri again? Harassing him again so soon? That was out of character.

"Which line?"

"She's here in person."

He blinked. "She?"

"Melissa Addison. She says it's important and confidential. Ms. Addison is looking very trim and professional today," Claire added expressionlessly. "So you shouldn't have any difficulties with awkward and inappropriate attractions."

He ignored the sarcasm. "That's very nice. Please send her in." Maestri sighed and spun his chair around to face the door. When it opened, he stood up wearing his best smile. Inwardly, however, he wondered why a distinctly junior manager would be confronting top management over a concern.

"Miss Addison, an unexpected pleasure. How was your flight here from Detroit?"

"Two tedious hours of cramped and intrusive hell. But that's not important. I'm here because you have a problem. A rather large one."

A rather aggressive opening, but the unpleasantness didn't register with him at first. Still smiling confidently at her, he waved her to a chair in front of the desk and sat down himself.

"The majority of my visitors usually say 'we' when they come to report a calamity."

"I'm not your majority." She removed a hand from her jacket pocket and thrust it toward him.

He flinched automatically. This was a primitive society and physical force between individuals was not uncommon. But her hand held a leather case, not a weapon. She flipped it open in a practiced manner, revealing a plastic card that bore her photo image and three large black letters above an undecipherable block of minute text.

"Federal Bureau of Investigation," she informed him unemotionally.

"Oh." His brain began to whirl. FBI? This was their nationwide alien investigation organization . . . he enjoyed watching the replayed dramatizations of historical incidents late at night when he had trouble sleeping. But how had they found out about *him?* He was certain that he had been ever so careful!

"Fraud division," Addison continued.

"Fraud?" Relief flooded his system. A mistake! Almighty Monitor, he'd almost ruptured a cerebral vessel!

"As in bogus transportation scam." These last words were delivered with grim impact, like nails being hammered slowly into the lid of an archaic wooden coffin.

"You mean the Phoenix?"

"I mean ten to twenty-five years, with perhaps time off for good behavior."

He gave her a look heavy with patient restraint.

"I think you're making a very big mistake."

"Am I?" She smiled, "Did you really think the American public was going to buy your line of crap about cars that run on static? A hundred years ago bunko artists were hawking pills you put in a gas tank filled with water. This scheme is no different, just a hi-tech gonzo variant. Much more imaginative, though, I'll give you that. But still bogus. I'm just wondering where you've been for the last fifty years.

The gullible consumer has gone the way of the dodo, replaced by a new species: *Buyus suspiciosus*."

"But what if Phoenix really works?"

She shook her head so violently her bobbed hair flipped back and forth. "If it truly worked, you'd have them out on the street. I haven't seen a one. None of your sales managers have, either. Therefore, Phoenix is a scam."

His office door banged opened on them just then, and a young man heavy on muscle and wearing a conservative suit pushed his way past an angrily resisting Claire. He had seen enough local TV to know what this meant. Busted!

And they hadn't even held a commercial break.

Claire was furiously gesturing at her cell phone as Mr. Muscle snapped a flexible plastic tie around his wrists.

"What? I have a call?"

She nodded.

"Put it on speaker!" he yelled as they started hustling him toward the door, Miss Addison in the lead, beaming happily.

Claire hit a series of buttons on his desk phone and the prim voice of the automated inventory monitor in charge Maestri's lakeside warehouse boomed into the office.

"Transport B2Z-POE has now docked. Per standing instructions, inventory is being off-loaded and prepped. Initial shipments of dealer vehicles are in progress."

Maestri did a makeshift little dance in place.

"Before you arrest me," he suggested innocently, "how would the two of you like to go for a little drive?"

It was only a short drive. When they saw roughly six million preassembled Phoenix units, freshly cleaned, doused with "new car smell," and arrayed in floor-to-ceiling cells awaiting shipment, Mr. Muscle reached down and clipped the plastic cuffs. Miss Addison just looked glum.

He invited her into the driver's seat of one of the demos and gave her a key. Beefcake climbed in beside her, and the self-spooling protective belts next to the very plush and wide seats collected them both. The city traffic outside the warehouse was daunting, but as Addison zoomed up the onramp onto the Beltway he could sense, by her wide and happy smile, that his work here was done.

"My assistant keeps blank purchase contracts on-line," he said almost absently. "If you like, we could have this one transferred to your office . . . say, as a surveillance vehicle." He glanced at her very large companion. "Perhaps a pair . . . which should help clear up this unfortunate perception of the Phoenix being too good to be true."

After that, word traveled fast.

Two days later Southern California faxed in an order for two thousand units. Florida soon followed suit. The only laggard was the Midwest, but it was conservative territory.

Delighted and relieved, Maestri had Claire make a special trip out to purchase a gold frame for the So Cal fax and that afternoon facilities affixed it to the chrome window pillar opposite his desk so that whenever he looked up, there it was, gleaming and triumphant.

When Stri called, it was a much more diffident force advisor who opened the conversation.

"I don't know what you did, or how you pulled it all off, but I'm impressed."

"Just good luck," Maestri said modestly, grinning from ear to ear.

"When will you be ready for me? The Directorate wants initial deliveries within two solar cycles."

Maestri looked shocked. "Impossible. I need five."

The steel came back into Stri's voice. "You've got three. And I'm only being this generous because we grew up together on Walchand."

"You're a real friend," Maestri told him sourly.

Three short years for one operative to take over a world. "They're crazy," he muttered to the glass walls and gleaming buildings beyond.

But, surprisingly, less than six of the local months later, a bemused Maestri found himself face to face with his old friend the force advisor. Far below them, on crowded city streets, Phoenix and its countless offspring ruled supreme. The ebony vehicles were everywhere, utterly indispensable. Trucks, trains, cargo vessels, even air transportation, all but the most decrepit tramp steamers and third-world cargo planes were powered by some variant of Phoenix technology. There were even aerospace and military applications. The world rode and flew on pillows of magnetic flux. Unable to offer anything near as cheap and dependable, the local transportation giants had crumbled into bankruptcy.

Demand was phenomenal. Long-haul transports couldn't handle the quantities required, so he had automated manufacturing facilities operating day and night. MX TekWay had become so huge that the ugly "M" word was starting to be bandied around at local government regulatory agencies, and Maestri had to deploy a small army of lawyers to implement defensive stalling tactics.

Society had indeed changed. The archaic by-product of organic sedimentation, once the life-blood of this world's mobility, was now little more than a component of grease. The once-wealthy producer nations had reverted again to feudal backwaters of heat, sand, and scorpions. Opulent palaces had been subdivided into teeming condos, and the kings of world terror, having lost their bankers, had retreated to forgotten, rocky places no one else wanted and found contentment with goats, a species of unpleasant local quadruped.

Ironically, his secret war had brought peace.

It was the millennium.

It was victory.

It was almost too easy.

Maestri, still dark-haired and vibrant, stood at ease in front of the big windows of his top floor office, his hands clasped behind his back. "I'm almost sorry it's come to this," he told the stocky, grizzled figure sitting stiffly in the functional chrome-and-leather settee against the far wall. "They'll make poor slaves, Stri."

"Surely you haven't come to like them?"

"Hardly. But one can love the chase and still regret the capture. They have spirit, and a certain ingenuity." He turned away from the window and the late afternoon sunlight washed across his craggy features. "Since you're here, I'm assuming that it's time."

The force advisor nodded.

Maestri sighed. "Very well. Do it."

The stocky alien touched a boss on the bulky belt buckle at his waist. Beyond the windows, the muted hum of traffic was abruptly silenced. There were a few loud crashes, screeches of metal on metal, and then stillness. "I'm always amazed at the gullibility," Stri announced. "Did they really believe that Big Bang static was powering their motors?"

"Not at first. That's a big pill to swallow. But the convenience and economy won them over, and the satellites that really broadcast the power are so well concealed that not a one of them ever suspected. A world that wants to believe is totally vulnerable to the man with the right lie." Maestri's imagination visualized aircraft high in the air abruptly finding themselves without thrust, falling free, and a shiver ran up his spine. "Death by marketing," he murmured.

"What did you say?"

"I observed that there's not much challenge left in this game."

His visitor nodded. "Yes. Another triumph for you. The planning and execution were flawless. The Directorate will be delighted by the economy of yet another bloodless coup. Old friend, you're making my armed fleet look like expensive excess."

Outside, the brilliant sky was growing dark with descending ships, blocky shapes . . . troop carriers that would later double as transports. They both moved closer to the big windows to watch.

The streets below were still. Nothing moved. Every Phoenix was inert now that the external power source had been cut.

"We'll wait until the food situation becomes critical and they grow weary of dark homes and cold beds. Then the relief ships will land. Once they start taking our food, they're ours. Conquest will be gradual, just like boiling *sgorf* in a pot."

Maestri nodded. "They never know they're cooked until it's over."

Just then a shadow passed swiftly over the glass of the window. Surprised, they both strained to see, but it was gone in an instant.

"One of yours?" Maestri puzzled. "A scout perhaps?"

"Impossible. Against fleet orders."

The shadow returned, and descended until it was directly in front of their window.

It was a Phoenix . . . flying. The outer housing was a gleaming scarlet in color, so bright and gleaming that it hurt the eyes.

"That isn't possible," Maestri said aloud, unbelieving. "Nothing they have should be able to move, let alone elevate. And what's with that color coat?"

The force advisor pointed. "Look, he seems to know you. He's waving."

The tanned, golden-haired driver had the top down, and he was indeed waving at Maestri in a familiar fashion. Abruptly, recognition dawned.

"That's Southern California . . . one of my divisional sales managers. And he's got that FBI person, Miss Addison, sitting next to him."

Maestri felt a sudden pang of regret, of sweet opportunities lost, sweep over him.

"Should I shoot him?" The force advisor was fumbling at his belt.

"No, wait," Maestri grabbed the other's arm. It was too late for violence.

Other vehicles were rising up from street level, and these hulls were colored a no-nonsense, mottled tan. As they came even with the penthouse office, covers shot open on bow panels and the ugly blue steel muzzles of weapons were revealed, all of them aimed at their window.

The force advisor's face turned the same color as the first car. "Is this what you meant by spirit? Look, the Addison woman is holding up a sign."

Maestri's lips silently formed the native words:

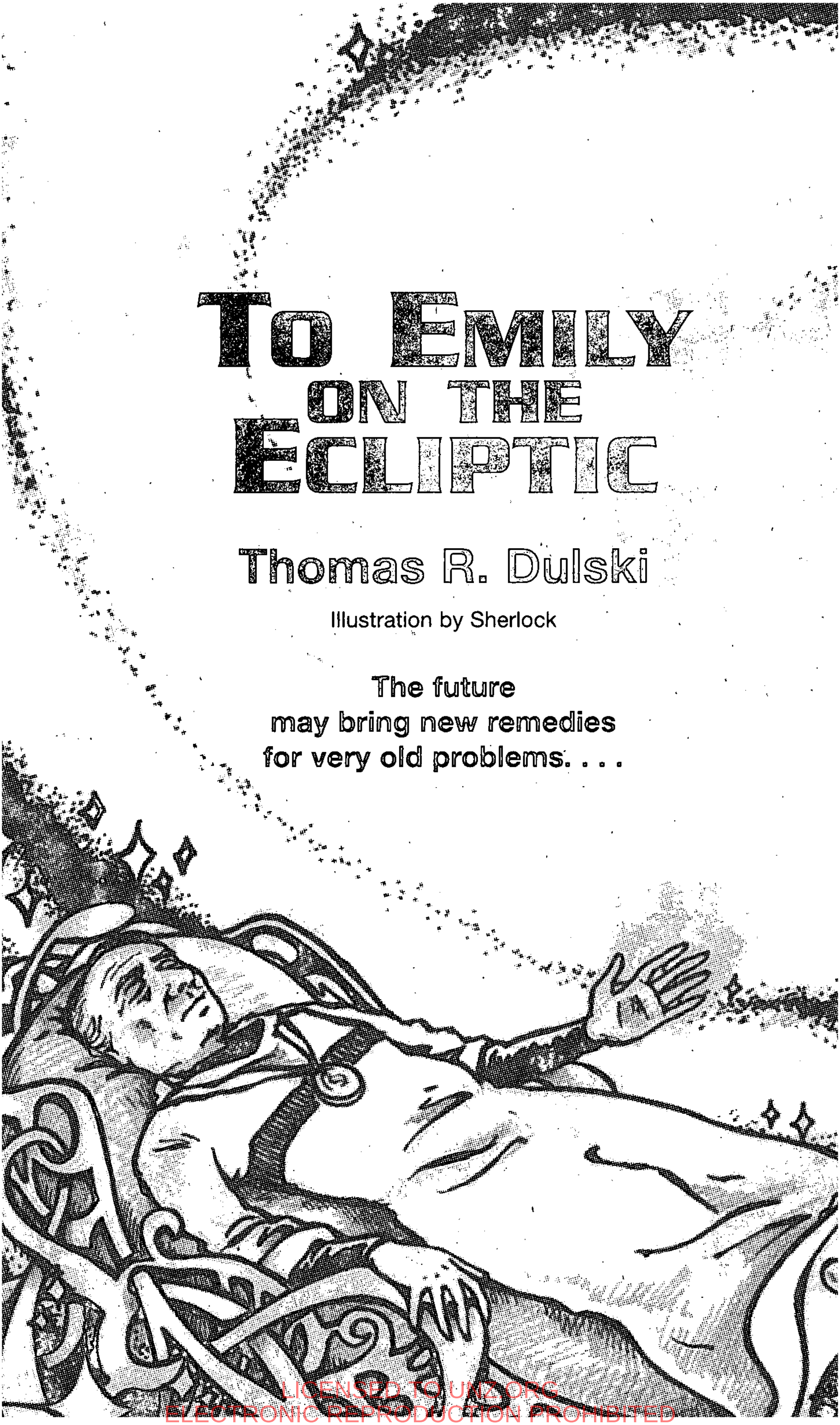
Thanks for the tip on the new energy source. Works swell! But our antennas are better!

"So much for the persuasive power of *Ekans* oil," he murmured.

"What?"

"I said, it will be a blessing to see home again, I've been away too long." Maestri allowed himself a long sigh that spoke of countless worlds betrayed, and much traveling in the Big Dark to no good end. "Hang around, Stri. You can help me pack."■

> If you are ruled by mind you are a king;
> if by body, a slave.
>
> —Marcus Porcius Cato

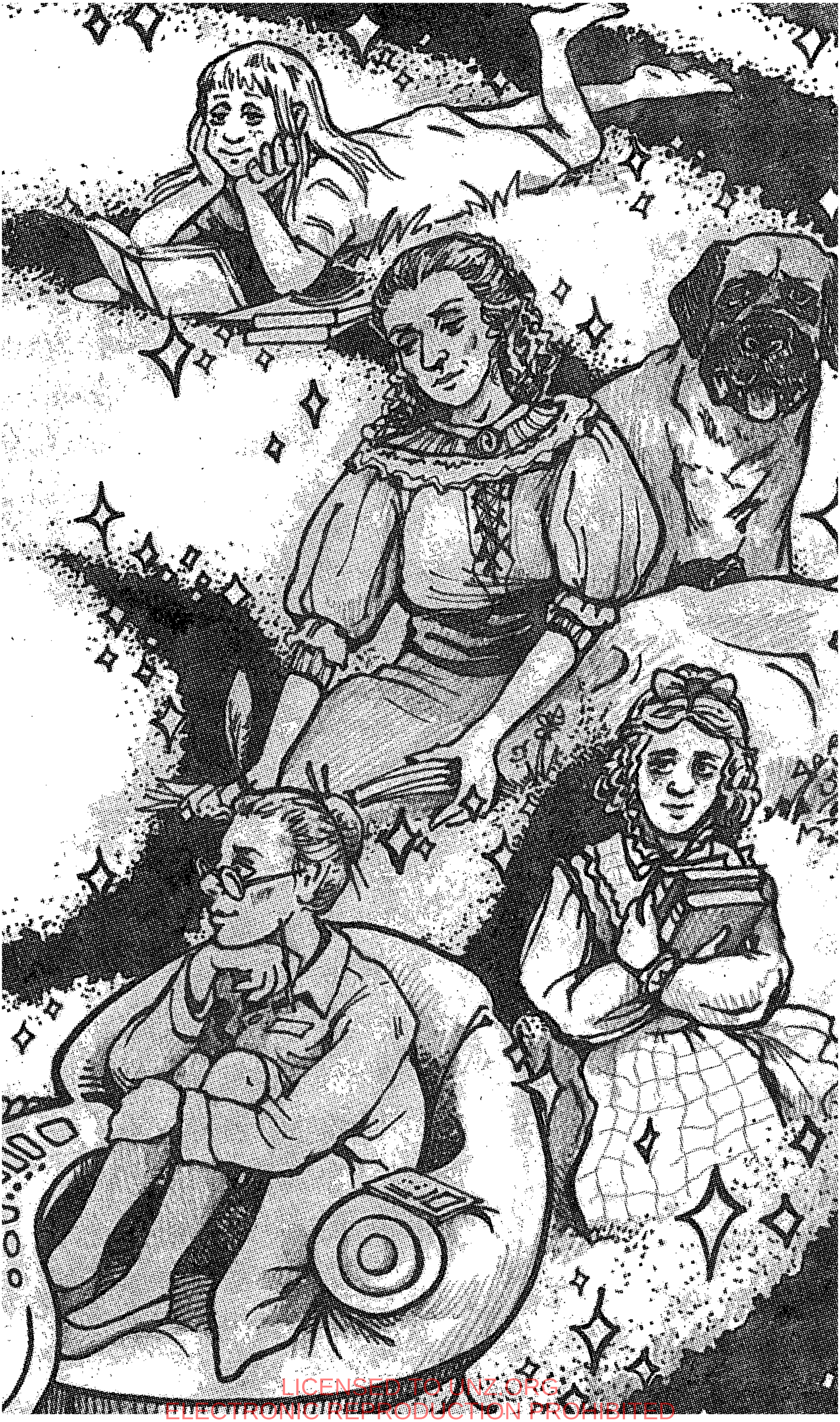


TO EMILY ON THE ECLIPTIC

Thomas R. Dulski

Illustration by Sherlock

The future
may bring new remedies
for very old problems. . . .



1. The Aneuploid Apostate

In creating, the only hard thing's to begin;
A grass blade's no easier to make than
an oak.
A Fable for Critics
—James Russell Lowell

The room was large and full of noise and people. It was night outside—a cool breeze was blowing long white curtains into the room from two tall moonlit windows.

From among the faceless party guests a woman's face emerged, candlelit by a flickering wall sconce. He began to drift towards it, strangely drawn by her beauty and an aura that seemed to imbue him as each step resolved more of the vision. Bumped and jostled by the dark anonymities milling in the room, he stumbled forward.

The woman looked at him with eyes like amethyst. Just one riveting glance, then her attention was drawn away by some dark stranger who murmured near her ear, then raised her hand to his lips.

Music rose somewhere; soft, swirling, full-orchestral cadences. The room quieted as the faceless people began to coalesce and pair. The woman's clasped hand was raised and she swung her other arm to the shoulder of the dark companion. They danced. The room danced, transforming into a gray-toned kaleidoscopic image composed of circling pairs of shadowed figures. The couple was lost in the dark arabesque. The music surged—massive, wave-like, spinning figures of sound.

Then:

He danced.

Marvelously unimpaired, he danced with a frantic abandon yet a controlled grace that exhilarated and defined him.

He spun and kicked and spun and kicked and spun again. It was a Highland Fling and Maleus Taub was dancing.

The luminous moons swam as reflections in the glistening ebony floor.

A space began to clear around him as he danced. The swirling couples eddied and stopped and backed away.

He spun on his heel and potted metallized fronds shimmered in his wake of air.

The cadences resonated through the soles of his feet and they told him: *faster*.

Now there was no sound but the music, there was no dance but *his* dance.

Stars twinkled rhythmically beneath his feet—the constellations were piping for Maleus Taub!

The faceless couples stared. Shocked perhaps. Offended. And yet, he danced . . .

A microcurrent from the biocircuits in his stub of a tail brought Maleus Taub to full wakefulness. He opened his eyes, then closed them and nestled deeper into the gel-filled cushions of his sleep basin.

It had been a dream. Beautiful and disturbing in its unfulfilled promise. The music continued to play in his mind. It was something ancient and obscure that he'd once heard in a random sampling of the archives. Malcolm Arnold. *Scottish Dances*. Twentieth century. It was some peripheral memory in his tail that had been talking to him in his sleep. He listened to the lilting cadences, trying to resurrect the feeling of freedom and abandon he had felt only moments before.

It was hopeless. The swaying music was fading . . . *Gone*. He lay a few moments longer, staring at the blackness of his closed eyelids, wrapped in a sense of loss. It would have been so pleasant to drift back to sleep and recapture his moment in that dark room. He remembered the woman with the violet eyes. *Or perhaps, not*, he said to himself. There was a meeting with the Prime Laureate this morning—something quite important, something disturbing. His tail was telling him that he had better get up.

"Disengage," he said in mild annoyance, though it was only a whisper.

He rolled to the basin's rim. The sides lowered and Maleus raised himself carefully to sit on the yielding edge. He yawned and stretched, blinking at the early golden light as the wall-pane cycled. He retrieved the ornate porcelain bowl on the nightstand, dipped his fingers into the brine and touched them to his lips. "To taste the tears of the day," he said, mechanically. Then, carefully replacing the bowl, he began to put on his legs.

The dream vaguely troubled Maleus as he passively waited for the bath to complete its morning cycle of ablutions on him. He was still pensive as he stepped out of the warm, perfumed air currents and into his waiting cassock. Only the weight of the collar and the Poet's Pendant, which the mechanism draped against his chest, caught his attention and made him look up at his reflected image in a silvered mirror that materialized on the facing wall.

It was a lined, one might even say a craggy, face that looked back at him. A prominent brow, gray, wiry eyebrows, and a nose that was, perhaps, a bit too large. People said such faces had character when they wished to be polite. He touched the large amulet that hung about his neck—clear iridia glass, and within, a tiny flickering orange flame. His fingers cupped the dancing fire. "Maleus," he said, "I believe that mother would not have approved. You are past due for a makeover." Something about the thought cheered him and he walked to the breakfast table, humming to himself over the nearly inaudible whirr of his legs.

It was some sort of melon this morning, and one of those inexhaustible vitamin-supplement juice mixtures that the console kept concocting. This one was oddly aromatic. Terran bananas and Mintakan allfroot, perhaps—Maleus had little fondness for either. He set the cup down in mild distaste and began to page through yesterday's work.

An assortment of minor pieces. Much of it needed rework and little, if any, would ever see the light of day. Little stillborn fragments: a beginning, an ending, some muddled lines of blank verse—collectively, a small sheaf of rather uninspired *haiku*.

Maleus set the handwritten pages to one side and dialed for music. "Arnold. *Scottish Dances*," he said.

He finished the last of the melon just as the music ended. Maleus picked up the pages briefly, weighing them in his hand for a moment, then tossed them into a drawer on top of a pile of similar sheets. Rather than query for another music selection, he dialed for yesterday's message.

The face on the table-field peered at him over the remains of his breakfast. It was the familiar visage of Alba Trimurty, the Prime Laureate: Shock white hair, styled into a consciously disheveled mass across a wrinkled brow, watery blue eyes, thin lips that trembled before he spoke. "Conceiver Taub, we need to talk. Very soon." A pause, shifting of papers on his desk, clearing his throat. "Maleus, believe me, I know all about writer's block. We are not on an assembly line here . . ." The liquid eyes peered at him over the melon rind. "But . . . it has been too long. I need something . . . soon . . . for the Council meeting. You should know by now that I have faith in you. You *have* the gift. But it has been too long. We must talk. There are means . . ." The image of Trimurty found a page and raised it, blocking its face. The words hung in the air over the breakfast table:

If
There were
Some subtle way
To slip between the folds
Of a flower.

"I believe in you, Maleus. Let us meet. Tomorrow at 10:00." There followed a beep that contained a compressed version of the message for Maleus' own biocomputer.

Maleus took one final sip of the fruit drink and, wrinkling his nose, rose from the table. It had been more than interesting to see those poem lines in the phone message since Maleus regarded it as a fragment from some of his best work. Perhaps the Prime Laureate really knew and cared, as he purported. But even if that were true, what could he do about the current wasteland between Maleus' ears?

He began to pace in the small apartment. There was no sound but the loud tick of a pseudo-mahogany clock and the soft whirr of his legs. Morning light laid bright rectangles on the rug that warmed his bare feet. He paused a moment, wriggling his toes in the warm pile, smiling sourly to himself.

I can write, he thought. *That is what I do. It defines me now.*

Passing the auto-folio he clicked it on, absently. It was at some register of years ago. The room before him shimmered and lit up, words hanging in the air:

I
Am
One
Come
Quite
Lately
Through
Sidereal
Ship-lanes:
Shimmering,
Mellifluous,
Transcendent
Archipelagoes.
Rationalized
Cartography;
Spiculated
Itinerary.
Galactic
Journey
Speaks
About.
Only
Ear
Am
I

Maleus stared at the words of more than a decade ago and sighed. *That was another you*, he thought, *fresh off the liner on Old Terra and waiting for recognition, and yes, maybe, fame.* He tapped the control and the folio scrolled:

The solemn tolling of the snowy
trunks—
Sealed, silent, sacred.
White furred life blinks,
Ice crystals drop from a snow-rimed
muzzle.

No, not enough. That trip to the pole was wonderful, but not as inspiring as I'd imagined. It all lacks coherence.

Lately, his work . . . Maleus smiled to himself, *Lately? Two years.* It was all a little too . . . calculated, formulated . . . too . . . cute. *Who are you writing for?* he asked himself, suddenly aware that the question had been hanging in his mind for months.

He shut down the folio with a wave of his hand, donned sandals and tossed on a cap. Perhaps a morning walk would clear the cobwebs. He could walk to the meeting and use the time to decide what he was going to say. He slid open the drawer where the hardcopy sheaf of his polar saga, *Snow Blind*, had lain fallow and incomplete. *No*, he thought, *there is nothing yet to show there*, and slid the drawer closed. Instead, Maleus tucked an empty scroll-pad and stylus into his cassock and, deliberately humming the last cadences of the Arnold piece, stepped out into the sunlit morning.

Like many of the coastal cities on Millikan's Drop, Haad Anchorage was laid out in a semicircular pattern with all the major streets focused radially on a kilometer-long jetty of dense white polymer where all the turbofoils of the fishing fleet were docked. The sun, Amos, was already high in a pale-green, nearly cloudless sky. Only six light-minutes away, it was a dim, off-sequence anomaly, torn by supersonic storms, with an unknown past and a questionable future. Now its ocean image was a lake of dancing sparks. Maleus squinted at it and then found himself momentarily blinded by superposed blotches of red.

Haad Anchorage was not significantly larger than most other seaports on this largely archipelagic water world, but it had been originally designated Site Prime by the Terran expedition that had first settled here over a century ago. Such places tended to remain seats of government and centers of culture. And so the city was distinguished by three white spires of spun alumina monofilament that rose above its eclectic tumbleblock skyline.

Maleus shaded his eyes from the glare at the eastern horizon. The Tower of Jeffrey was nearest at the end of the Street of Sighs. Already, flocks of glidingtails were leaving their roosts in its high cornices to seek their breakfast at sea. The Tower of Babs lay in the distance, at the city's northwestern limits. But Maleus' goal this morning was the Tower of Martins—a white obelisk, 500 meters high—a little more than a kilometer away, near the waterfront, but across a tangled path of cross-streets that led through the open air markets. The white monolith already shimmered with heat and distance as Maleus set out toward his morning meeting.

The city streets were only just beginning to stir, despite the lateness of the morning hour. Street markets were open for business, but there were only a scattering of shoppers—a young woman picking over a pile of pink fruit, a Boduad from one of the Ritteau Worlds buying a bolt of cloth. An occasional curricle air coach would whiz by overhead, and from time to time a bicyclist would snake by Maleus as he walked, but for the most part the streets were empty.

A barrel full of gaudy-shelled crustaceans clittered as he passed. Much of the seafood that would be sold today was only now being unloaded from the holds of the turbofoils at the docks, though a few levitated pallets were already arriving, their chilled beds lined with neat rows of fins, tails, and glassy eyes.

Maleus thought he recognized the head chef from a nearby hostelry who was already rubbing his chin in a characteristic bargaining pose as he haggled with a merchant over a refrigerated row of gaping mouths.

We are, indeed, a sea-oriented people here, Maleus thought, reflecting on the obvious, and thinking for the first time in years of his own past. For an instant an image of his life in the sea flitted through his mind. *That was not a bad time—when you breathed through gills* . . . The image of the surface returned to him—the interface of water and air—a lacquered pool of dancing light, and magically, beyond: the world of air. He had been—what?—six years old when his mother had arranged things. But before . . . The shimmering depths, the three dimensional freedom. *I used to dance with the schools—thousands of tiny silver bodies, moving as one—in great clouds we played. Water Babies. Charles Kingsley, nineteenth century Terran author. Bit of fuss with Cardinal Newman . . .*

Maleus stood and watched some merchants struggling with a large tub of green-shelled bivalves, already sweating with their efforts despite a cool morning breeze from the sea. The world of the sea—could any air-breather know it? At best they could know the struggle at the interface: *Masefield, Melville, Conrad, London, Coleridge . . .* Was it his mission to write about life *in* the water? He *had* experienced it, if only as a young child. Would memory serve?

Certainly, the air-breathers' struggle with the sea was outside his experience, but now he could hardly imagine himself shipping aboard one of the turbofoils that put out each dawn. His mechanical prosthesis would probably disqualify him from work aboard a heaving deck. Still, there was something to be said for writing about the familiar . . .

Maleus paused, catching sight of a glidingtail perched on a nearby streetlamp. *Perhaps, a smaller thing: a poem about the great flocks of life that sleep* *in the city at night and soar over the ocean by day. A solemn and unpretentious cohabitation—an arrangement accepted and unquestioned by man and animal . . .*

With just that thought Maleus was about to turn and resume his walk when the glidingtail swooped down from its lantern perch, seized an illicit prize from one of the refrigerated pallets, and fluttered away down the narrow canyon of Church Street, amidst a chorus of startled cries.

Maleus smiled and tipped his cap at the street vendor, who, hands on aproned hips, continued to stare at the diminishing speck that had stolen his merchandise.

"Coffee? Tea?" Another vendor beckoned at him as he passed. "Tisane? Earl Grey? Blue Mountain? We have it all, sir." The smell of roasting beans *was* inviting, but Maleus walked on.

A Houdan pushing a levitated cart full of glistening silk scarves and hairbrushes eyed him with mild interest. "For the lady, sir?"

Maleus walked on, pausing at a bookstall to peer over a few of the titles. Real books were rare and expensive out here on the Rim. There was little market for antiques. He owned a few cherished volumes, but his stipend was too meager for a large collection. His eyes ran down the row of plastic spines—*Moby Dick*, *Jane Eyre*, *The Great Gatsby* . . . Some specialty publisher in the Veil had reissued old Terran classics. *Bleak House*, *The Adventures of Huckleberry Finn*, *The Stars My Destination*, *Vanity Fair*, *Middlemarch* . . . Maleus paged through a few, enjoying the tactile feel of the paper and the bindings.

At the expectant attention of the stall vendor he shook his head and walked on.

Church Street was a carnival of stands: flowers—rainbows of fragrant petals and fronds; baked goods—fresh smelling loaves and rich-looking pastries; spices and herbs—heady aromas and exotic airs, both culinary and medicinal; music—pellets full of resonance and rhythm, both faddish and timeless.

Maleus walked without pause for several minutes, absorbing the sounds and sights and smells until the old cathedral loomed before him. Directly across the narrow street, nudged between the encroachments of much newer buildings, an anachronism from the Second Age of Faith, it was the Basilica of Lachryma Christi. Winged sentinels guarded the ornate doorway—stone angels with chippéd noses beckoning with blind eyes.

He crossed the street, dodging a determined matron on a tricycle, pedaling with abandon.

He climbed the stone steps and entered, hesitantly, into echoing silence and the smell of burning incense. A service was in progress, although the long rows of pews were mostly empty. There was a scattering of the faithful—Terrans, mostly, a few Houdan, and a Boduad or two in the back rows, kneeling, and off in their own world. These were street merchants, Maleus realized, meeting their God before they met their day.

Maleus, somehow, felt like an intruder here, and yet he was drawn and comforted by the reverent calm.

To taste the tears of the day. The salt water basin, intricately carved of some richly veined mineral, stood before him in the vestibule, a ring of white crystals defining the small saline puddle within its recess. *The weight of centuries is behind this*, he thought. *How mechanical it has become for some of us, tinged with doubt and denial, and yet curiously necessary!* He reached in his hand and touched the little pool. *Whoever you are . . . please give me the grace to use my gifts!* He touched his moist fingers to his lips. There was a moment of inner peace in which belief and doubt merged into a strangely comforting concinnity.

Then he turned and stepped out into the warm morning, blinking at the sunlight. The dim solemnity had touched him more than he expected, but now he welcomed the distraction of the streets. It was only a short two blocks to the Tower of Martins.

"Conceiver Taub, you are a bit early." The amanuensis was a red-haired young man—probably a colonial from one of the worlds of Rita's Veil, judging by his accent. "The Prime Laureate is finishing some papers. Perhaps you'd like to wait in the library?" The secretary gestured toward large ornate wooden doors.

Maleus nodded. It was a rare opportunity to glance at some of the Order's collection of first editions. He pushed at the unyielding Terran oak, then waited for the buzz from the secretary's concealed button. The doors swung open and he entered a large room lined with bookshelves. He shivered for a moment as the doors closed behind him and a waft of chilled, humidity-tempered air brought a distinct odor—the exudation of centuries-old glue and paper, and, yes, parchment.

Row upon row of books confronted him—all ancient and real. Leather and buckram bindings—these were all from Terra. This archive—perhaps ten thousand volumes—was a legacy of Manhome's past, something unspeakably rare this far out on the Rim.

His fingers seemed to tingle as he traced them across a few of the embossed titles. Here was *Alice's Adventures in Wonderland*, *Babbitt*, *Candide*, *David Copperfield*, *Emma*, *Finnegan's Wake*, *The Great Gatsby*, *Hamlet* . . . All were printed on Terra, possibly—some certainly—a millennium ago, sequestered and preserved as a legacy by the terracentric Order. And the poetry . . . *Goblin Market*, *Hudibras*, *The Iliad* . . . Here were *Sonnets from the Portuguese*, *The Sonnets of Shakespeare*, the collections of Millay, Pope, Service, Stevens, Tennyson, Wordsworth . . .

Did he dare remove a volume from the shelves and page through it? Would the precious pages crumble in his hand?

The speaker sound startled him: "Conceiver Taub, the Prime Laureate will see you now."

"I'm very old, Maleus," Alba Trimurty said, and he looked it. The Prime Laureate was hunched over a desk piled with manuscripts. The large office had the same consistent aspect of calculated disorder as the venerable figure's own visage. "There will soon come a time when I will have to retire." The watery blue eyes regarded Maleus with a weary but penetrating stare. "When you were new to the Order I had a very good feeling about you. I thought, perhaps, some day you might take my place."

This was an unexpected revelation, and Maleus stiffened in the comfortable chair.

"But I haven't seen anything of substance from you for . . ." the white head bent over a sheaf of papers ". . . nearly two standard years."

Maleus opened his mouth to respond, but the words did not come.

"Two years," Alba Trimurty repeated. He wiped his nose with a silk handkerchief then stared hard at Maleus. "I need to know what is going on."

Maleus sunk deeper into the yielding upholstery.

"We've had other Mendelkinder in the Order, you know. Poets who have done good work . . . not that you haven't . . . but I mean, consistent work . . . dependable work . . ." The Prime Laureate was trying to meet Maleus' eyes, but without success. "That trip to this world's southern polar landmass was financed by the Order. I had to fight for that for you, Maleus . . ."

"I have something." Maleus offered feebly. "It needs work . . ."

The Prime Laureate was shaking his head, white hair flopping oddly on his forehead. "That's not good enough, Maleus. I need something . . . now."

Maleus felt tears welling in his eyes

and fought back the emotion. "The words are not coming," he said. "Not like they used to."

Trimurty sensed the despair and softened his tone. "I may have an answer for you, Maleus."

Maleus met the old poet's eyes for the first time, but remained silent.

"Did you ever hear of the Teydurax?" Trimurty fixed him with a watery stare, thin lips trembling expectantly.

"Only the name and a few facts . . ."

"They are an advanced alien culture. Millennia ahead of us, they tell me . . . not just in technology, but culture and . . . well, philosophy, I suppose." Trimurty cleared his throat noisily and shuffled papers to collect his thoughts. "They came unexpectedly to some outer Rim worlds about 20 years ago . . . made their case, such as it was . . . and left just as mysteriously. But they left behind a lot of stuff—objects that are still being studied—but also concepts and ideas that are still being pursued." Trimurty brushed at his hair to no effect. " It has emerged as a unique and quite special discipline." He held up a folder. "Teydurax Studies," he said. "It's being offered as a graduate course at major universities all over Occupied Space, including here at the New Terran Center."

"You want me to take the course?" Maleus offered.

Trimurty flopped the folder on his desk. "No," he said. "I want you to talk to one of the teachers."

2. Let Me Not Seem to Have Lived in Vain

What is the worst of woes that wait
on age?
What stamps the wrinkle deeper on
the brow?
To view each loved one blotted from
life's page,
And be alone on earth, as I am now.
Childe Harold's Pilgrimage
—George Gordon, Lord Byron

Maleus extended his hand and touched the upper left hand corner of the Rosetta Stone. The surface felt cold and rough: obviously solid, unyielding stone. Except that he knew it was an illusion. The actual object—the key to one of the great archeological breakthroughs in Earth's history—was 650 light years away in the British Museum in London. The same words on the stone were repeated in Egyptian hieroglyphics, in a cursive form of hieroglyphics called "demotic," and in Greek. With this one clue Champollion and Young had unlocked the language of a powerful and mysterious culture that had awed and puzzled mankind for millennia.

Maleus withdrew his hand and nodded at the frowning museum guard. The sign clearly prohibited reaching into the solidus field. He leaned on the railing, musing about the analogy between ancient Egypt and the Teydurax.

Maleus had, in fact, read some of the current literature about those recent visitors from outside the galaxy. The pattern had been the same in a handful of locations on the Rim. A strange object appears in orbit around some habitable world. Somehow it absorbs neutrinos, suggesting nearly infinite density but, inexplicably, without the associated gravitational mass. A monolith of some complex polyhedral shape appears on the planetary surface below. Tall, loping creatures with bird-like faces have brief interviews with a few Terrans, and one or two other races. The polyhedrons and the orbiting objects vanish after a few years, leaving in their place a variety of strange artifacts, most with unexplained properties, and all with some sort of associated mystery.

Maleus tapped the museum railing absently. "And now we have Teydurax Studies," he said aloud. He regarded the image of the stone tablet before him. Was there a Rosetta Stone among all those Teydurax objects with their rumored miraculous properties? Was there some key to that mysterious race that would reveal their tricks as only a previously unknown feature of natural law? Argument from miracles presumes that natural law is perfectly known. *And so then I must not say that anything is wonderful until I know perfectly everything that is possible.* Building the pyramids turned out to be just a neat use of physics and engineering. What of the Teydurax wonders?

Except that the poet in Maleus rebelled. *Suppose it's all definable, all math and physics, it still is wonderful. Just as a logical syllogism is wonderful. Just as waking from a dream in which you are dancing is wonderful. Knowing exactly why and how something occurs does not diminish it. Someday we will know down to the subatomic level exactly how and why a beautiful sunset brings tears to our eyes. We must learn to know and feel simultaneously, because . . .*

"Knowing is the only miracle," he said out loud—a little too loud for the museum guard, who widened his eyes and dutifully raised a finger to his lips.

Maleus emerged from the Haad Anchorage Public Museum blinking at the late morning glare. He still held the folder that Alba Trimurty had given him, though his sweating palms had begun to warp it. The words across the holotab were fogged but still legible:

Dr. E. A. Fisher
Teydurax Studies Institute
Suite 900A, Babs

The Tower of Babs was another long walk across the docks, where nets were being untangled and strung to dry, and tonnage catches were still being dumped. A small gray-furred boy, a Houdan, was strumming a banjo at one of the piers. The sheer strangeness of a lupine cub playing an ancient Terran instrument struck Maleus and he stopped to ask.

"Because it's neat, sir," the boy responded. "And because you can't play a sad song on the banjo."

Maleus smiled and tossed a coin into the overturned cap, more for the *aperçu* than for the music, then walked on. The rhythmic twanging gradually blended into the staccato of the dock sounds. Turbofoil launches were bringing passengers from a large liner anchored out in the deep channel. These were tourists who would spend the day shopping and soaking up local color. Then at dusk they would be whisked back to the liner for food and parties as the floating city weighed anchor and sped on to Jellynock Island or Wixcombe Portage—one of thirty or more ports whose primary industry was tourism.

As Maleus approached the passenger dock about two dozen people were streaming toward a line of waiting brougham air coaches. The drivers all looked bored, some were dozing.

A tall violet-haired matron clambered into the first coach in line, while her balding male companion punched at the keys of a wrist map. Finally, the little man barked something at the driver and climbed aboard. In moments the brougham was airborne and climbing into a mass of lime-tinted clouds.

Maleus took out the scroll-pad and stylus from his cassock, smiling a little at the thought that most of the tourists would have only the vaguest notion of what they were. He wrote in cursive Engla:

Violet climbs into green,
Dance fades into mystery,
The tune is not what it seems.
Why must you yet remain,
A fetus in the womb of the enemy?

He stood looking at the little screen, thinking, *What is that? Doggerel. Your artless unconscious talking again.* He snapped the lid and tucked away the offending words, walking hurriedly past the small crowd of people.

"Sorry . . . I didn't hear you come in." Dr. E. A. Fisher was a petite middle-aged woman with slightly graying brown hair done up in a beehive bun. She wore a white tunic that showed up a lean athletic torso and real leather buskins, tied off just below the knees. Her brown eyes twinkled behind a pair of wire-rimmed glasses. "You would be . . . Maleus Taub?"

"Yes."

"I had a call yesterday. Please come in and sit down." The woman waved at an array of stuffed armchairs in a palette of earth tones.

Maleus found a seat and looked about the small office. It was in marked contrast to the Prime Laureate's quarters. Everything seemed neat as a pin—even to the in and out boxes, where two evenly stacked piles of paper documents rested. But paper seemed incongruous here, even as it was expected from Alba Trimurty. The pictures that lined the walls were solidus field works of fruit and wilting flowers—crisp neo-realism still-lifes.

"I need to know about you, Mr. Taub," the lady began, taking her place behind the large wooden desk. "You're here because . . ."

". . . of writer's block," Maleus finished for her, feeling the pain and embarrassment of the words. Briefly, he stole a glance down at the Poet's Pendant. The orange flame winked at him, accusingly.

Dr. Fisher seemed to notice his glance, but continued. "First, let me tell you about the Teydurax Project." The brown eyes blinked behind the anachronistic eyeglasses. It was a fashion to wear the frames, but these seemed to actually have lenses in them. Perhaps she was one of the unlucky few allergic to the treatments.

"The Teydurax came to nine Rim Worlds—five in Rita's Veil and four in the Cul-de-Sac—all at about the same time. That would be twenty standard Terran years ago." Somehow, the small woman seemed to look a little lost behind the nearly empty desk and Maleus found himself beginning to feel sorry for her. "They came and they left. They talked with a few of us, but the words—and each word spoken has been studied in great detail—are often confusing, some say deliberately so." The little lady sat back in the oversize green leather manager's chair, and Maleus imagined her feet rising unseen above the rug. Dainty feet, Maleus remembered, with nails painted to match her eyes.

"You've heard of the Teydurax, Conceiver Taub?"

"Just newser accounts. They were . . . are . . . I suppose, the superior alien race we've been waiting for?"

"I don't think anyone quite predicted the form that this first contact took."

"They didn't say, 'Take me to your leader'?"

"What?"

Maleus shrugged, "Very obscure reference, doctor."

Dr. Fisher drummed her fingernails on the lid of a small lavender box set into the desktop. "You know, it might be useful if *you* first told *me* what you know about the Teydurax."

Maleus squirmed a bit. "Well . . . by most accounts they're not gods. I mean they die." He looked at her, suddenly feeling hopelessly naïve. "Is that right?"

"Yes, they die, but their average lifespan is in millennia."

"And they have ready access to almost limitless power," Maleus offered, looking into her brown eyes, expectantly.

"By our standards it *is* practically limitless. But by theirs—who knows?"

Maleus strained at his memory. "Aren't there—what do you call them—Dyson spheres in a lot of the local group of galaxies that were built or engineered by the Teydurax?"

"That's speculation, but, yes, it's generally believed to be true. Some people think that the Teydurax live in them. The objects exist, but the only thing we know for sure is the technology they provided that enabled us to image those objects." Dr. Fisher snapped on a small viewer and the desk surface shimmered into a dense star field with a prominent bubble of blackness. "We estimate *that* one at a diameter of half a parsec. At the stellar density in that region it may enclose three solar systems. All the structures that all Known Space races have built on a thousand worlds wouldn't make a visible flyspeck on that surface, even at a hundred times this magnification."

Maleus sat back in the yielding cushions and stared at the black bubble, like a circle cut out of a fireworks burst. The woman seemed to be waiting for some response. Finally, he sat up and shrugged. "I guess I'm wondering what all this has to do with me."

The diminutive lady shifted in her chair, which seemed uncomfortably big for her. "That's what you are here for, Conceiver Taub—to tell us how our current knowledge of the Teydurax can help you." She opened the lavender box on her desk and popped a pink lozenge into her mouth. Pill or candy, she didn't offer one to Maleus. "In order to help you with your writer's block, I need to know all about you." She smiled, revealing a warmth that may have been genuine. "I've read your life file from the Order, of course, but I need to hear your version. When I've learned enough I'll be able to determine if there is something in our current understanding of the Teydurax artifacts that will help."

"You want to hear my life story, then?"

"Relax and talk." The little woman put her feet up on the edge of the big chair and hugged her knees. "You know, Mr. Taub, I love a good story . . ."

Maleus sank back again into the cushiony depth of the soft chair and let out a sigh. *Where do you start but at the beginning?*

"I was born . . . decanted, they used to say . . . a Mendelkind on Sama Asfar, a watery world, like this, but with a yellow sky. The Genetic Banks had programmed my genome for the Aquaticorps. You may remember that Mendelkinder were still being produced in the Veil long after they were banned in the Near Arm. Anyway, for me that meant a life in the sea. Like all Mendelkinder, I was genetically programmed to be a first colonist—in my case on the first newly discovered panthalassic world that needed colonization and development. I was supposed to build their undersea cities—me, and a couple of hundred thousand like me. And, like all Mendelkinder, we were sterile, expected to die out after a hundred standard years or so, and leave all our legacy of work for the incoming colonists—the *real* people, some would say.

"Well, I had a mother. And therein lies a tale, because she was a very special person. I'm a little fuzzy on the details, but somehow this woman knew that I was derived from her genetic material and she got me out of the Aquaticorps and raised me like a pet goldfish in her swimming pool.

"She was old when I knew her. Old and rich. Too old to do much except throw her money around. But she . . . loved me . . . I think I can say that . . . Somehow, she loved this gill-breathing thing with a tail . . . I remember that she scared me once when she said that I had my father's eyes. She refused to elaborate, and I never pressed the matter.

"There were times when I would float near the surface at the pool edge, watching her pace and talk to herself in the lighted living room. Sometimes she would cry and I thought it would be worth drowning in the sea of air just to try to comfort her.

"When I was six years old she took me to a place. It was like a hospital but it had a different name. That was a bad time. I was frightened by what they did to me, but there was no pain. It was months, maybe a year. I remember wakening in a basin in a room of air and she was saying: 'Breathe!'

"'Mama!'

"'*Breathe*, baby!'

"It was like drowning, I suppose. I pulled on the sweet smelling gas and choked.

"I trembled all over until she held me. Then the pain in my chest turned to warmth. I was breathing. After that I fell asleep."

Maleus blinked and suddenly became aware that the room lights had dimmed. Dr. Fisher was looking intently at him. His palms were sweating and he rubbed them on the soft leather chair arms. He touched his forehead and it was moist too, even though the room seemed cool enough.

"Sorry," he said, "I was running on . . ."

"No, Maleus, that was good. Please go on."

"Well, at that point I was no longer suited for the Aquaticorps . . . or much of anything. You see they had removed my swimming appendages and fitted me with mechanical legs. They had to leave the tail, though. It was designed as a swimming and buoyancy appendage, but there's a big neural bundle there, almost an auxiliary brain with lots of autonomic functions. I couldn't walk or breathe without it. There's a wet/soft neural interface there also.

"As I grew I had to go back to that hospital place periodically to be fitted with new legs and other parts. Supposedly they reinstated fertility, but that has never been confirmed. It wasn't a very happy childhood."

"You had some childhood friends?" The little woman smiled at him, but her eyes showed concern.

"No." Maleus felt himself raking the rubble of the distant past. "Except . . . No," he said, finally. "Nobody wants a freak for a friend. I . . . dealt with it."

"You went to school?"

"Programmed tutor. Believe it or not, I was pretty good at math and science. Oh, there were kids . . . I remember my mother rounding up children for my birthday parties. When I was older I began to get the feeling that the kids were from some agency. Their parents were being paid to have them play with me. It might have been true . . ."

Dr. Fisher looked thoughtful and hugged her knees. "Everyone has someone, sometime, Mr. Taub, even if it's a fleeting thing. It's sort of important or I wouldn't press you. Don't you remember someone from your childhood who wanted to be a friend?"

Maleus found his cap on the chair arm and traced a finger around its rim. *Friend?* "Oh, there was . . ." He shook his head.

"Somebody?"

"Emily." He sighed and looked around the office, avoiding her intent gaze. "A little girl. Terran descent, I think. We used to play together at that hospital place when I was there for one of my surgeries."

Maleus became silent and Dr. Fisher had to prompt him. "Emily?"

"She was there for something serious—I don't know what it was. She was about my age . . . I guess I was ten then. We used to read stories to each other in the playroom. Books, I mean . . . children's books. I remember that she loved *Charlotte's Web*. Do you know that one, doctor?"

Dr. Fisher shook her head. "An old book?"

"Very old. It's stuck in my mind ever since then. It's a story about the friendship between a pig named Wilbur and a spider named Charlotte. You see, Charlotte was a writer . . ."

The diminutive lady behind the desk knitted her brows.

"She spelled out words in her web in the barn." Maleus felt slightly embarrassed but forced himself to continue. "I was beginning to write even back then—little poems that I showed to no one. But one day in that hospital place Emily saw me writing and she said, 'Show me.' And I did. I really didn't know what she thought. It frightened me to think she might laugh at them. I was too proud and scared to ask what she thought. And then . . . I was due to be discharged one morning and found a note that Emily left on my pillow. It said: 'You are a good friend and a good writer.' That's pretty close to the last line of that book by E. B. White."

Maleus felt flushed with self-conscious embarrassment. "I never saw her again. I hope she's alive and happy, wherever she is. In some ways I think that little note made me a poet . . . or whatever I am today."

Dr. Fisher nodded and smiled. "And so, exactly how *did* you become a poet, Mr. Taub? And how did you come to Millikan's Drop?"

"When I was twenty-two years old my mother died. I never did find out how old she was, but it had to be close to 200. She had been going to all sorts of places for makeovers for decades . . ." Maleus sighed, met the brown eyes behind the glasses, then looked away. "I buried her on Sama Asfar on a little strip of land that extends far out to sea at the very tip of the Rica Nok island chain. People go there to watch the golden sunsets. Someday I want to write about her . . . Someday . . ." Maleus drifted off into silence again.

Dr. Fisher reached for another lozenge. "What did you do then?"

"I sold the mansion on the hill. The money was not great. There were outstanding bills. With what was left I financed a trip to the first place I could think of: Terra."

"You went to Terra?"

"You've been there?"

"No, never."

Maleus looked up at the ceiling with a knitted brow. "It wasn't at all as I imagined."

"You were disappointed? Disillusioned?"

"I wasn't sure what I wanted at that time. I guess I had this daydream of studying science or engineering at one of the old Homeworld schools, writing poetry on the side. The aptitude scans from the tutor programs all led me to believe that that didn't have to be a pipedream. But when I got to Terra things just were not as I had expected."

"They didn't accept you?"

"I was told that most off-world parents apply years before the birth of the matriculant. There were quota limits for each galactic sector. It didn't take long to realize that it *was* a pipedream. And I wasn't interested in more programmed tutoring. I'd had enough of staring into a holo-field for hours on end.

"I got a job as a bellhop in a sleazy hotel in New York that catered to off-worlders. Two months later I was replaced by an android. The crowds of people in that city became oppressive, so I tried London and Paris, but they were the same. Then, I thought I'd get smart and head for the country—the Canadian Rockies, the Australian outback, the Russian steppes. It was all beautiful. But wherever I went there were developments, campers, settlements, tourists. I was running out of money and ideas. I was at my wit's end, but still writing—little short pieces. I still have some of them . . ."

"You were looking for solitude?"

Maleus pondered seriously for a moment. "No," he said at last.

"What, then?"

"I was looking . . . for a . . . face, a friend . . . maybe just someone to read what I had written . . ." Maleus looked into the empty hollow of his cap and sighed. "At some point I realized that Terra wasn't the answer. I bought a ticket for the Near Arm with almost my last remaining funds. I didn't much care where I was going. But as it happened it was Turing Halt—a mining colony. I worked as a bartender there for a year and learned a lot of ribald drinking ballads in a suite of different languages. I also heard a lot of stories. Then to earn some real money I did a turn for a year at one of the big smelters under a glacier, working with a lot of robots in an operation that never shut down. The money was good, but after a year I'd had enough. I'd been writing all the while . . . sending little pieces off to small literary journals . . . getting rejections . . . But one day I got a message that somebody on

Millikan's Drop wanted to meet me. That was enough to quit my job and ship off. And eighteen years later, here I am."

"Who was it that brought you to Millikan's Drop?"

"It was a rich man named Drice. Brilland Drice. He'd known my mother. He owned a chain of inns and hostelries on a couple of dozen worlds, but he lived here where he'd got his start, in a penthouse on the top floor of one of his hotels. Mr. Drice fancied himself a patron of the arts. I think he was instrumental in setting up the Order of Poets on this world. I guess he saw my name somehow through one of his editor friends. At that time I'd been sending my poems all over creation. A few even got published. I think he recognized the name and associated it with Mrs. Taub. I'm a little fuzzy about the connection between the two of them, but I'm fairly certain that he wasn't the father my mother had hinted at. Anyway, we exchanged some correspondence and he sent me a one-way ticket to Millikan's Drop.

"When I got off the liner I was only twenty-five, but full of a sense of my ability as a poet."

Maleus asked for water and a small siphon on the desk dispensed a glass. He sipped pensively. "When you're that young," he said, "you tend to be full of yourself. I met Mr. Drice and told him that I was going to be famous one day. I'm not sure what he made of that, but he set me up here at Haad Anchorage. He introduced me to the Order of Poets, where he had strong connections. I was inducted two years later at twenty-seven. They tell me that was young."

Dr. Fisher shifted through some papers and tabbed a read-out. "You did rather well, from what I see," she said. "Several awards, three collections, good reviews . . ."

"Journeyman work. I never felt that I had lived up to the potential that I imagined I had. By the time I was thirty-five I was frustrated. Now that I'm in my forties I feel that . . ."

"What?"

"That I've lost it all."

Dr. Fisher caught his eyes and smiled. "Mr. Taub, I have some of your works here in this file. Let's look at this . . ." And the desktop shimmered into words:

A child of heaven,
Nodding with sleep in the arms of the grave,
Remembering the dancing sparks,
The ancient unutterable.
Child of Earth,
Remembering the touch of what was never grasped:
The cool cheek of truth,
The light brush of God's hand,
And then the stunned silence.
A child of man,
Sleep remembered him.

"Would you like to comment on this? You wrote it ten years ago."

"Standard answer," Maleus said. "It says what it says. If I could say it a better way I would have."

"Do you regard yourself as a 'child of Earth'?"

"Genetically?"

"Genetically and culturally."

"Yes."

The little lady regarded him thoughtfully for a few moments as the floating words between them faded. "I think I can help you, Mr. Taub," she said.

3. Walking the Planck

Why meet we on the bridge of Time
to 'change one greeting and to part?
The Kasidah of Haji Abdû El-Yazdi
—Sir Richard Francis Burton (trans.)

The room was large and dimly lit by glowing candles. The people were faceless shadows, talking gaily. There was the clitter of glasses.

The woman was quite alone, seated next to a candelabra that cast a warm glow over her face. He walked towards her and she nodded at the seat next to her. He sat and studied her lovely face as she silently regarded the dim features of the room. The silence between them was tangible. He could smell the perfume of her hair.

Maleus awoke to the muffled sound of a morning thunderstorm. The auto-tint circuits in the window frame were too slow to filter out the savage flashes of lightning that cast grotesque shadows around the darkened room. Thunder crashed moments later, like a titanic weight being dropped nearby. Maleus vaguely remembered a newser story about some Pecos Bill Terraformers being awarded a contract to raise the mean ocean temperature half a degree. A few side effects, like early morning thundershowers, were expected. He lay there for another moment, watching the flashes through closed lids and listening to the tick of the mahogany clock until it was drowned in a crescendo that rattled something in the auto-kitchen.

Dawn was an hour away, his tail told him, and yet he knew that he couldn't go back to sleep. He disengaged the basin circuit and sat up, thinking about the interview with Dr. Fisher. She had suggested a good night's rest before beginning the therapy this morning, but that was now certainly a lost cause.

Maleus regarded the stumps of his thighs on the basin edge as the light and shadow flashed around him. The little ornate bowl awaited his fingertips on the nightstand. He absently ran a hand through his disheveled hair. "Just what have I gotten myself into?" he said aloud. The confused room circuits then materialized a large blue question mark that hung like an ominous icon in the flashing air.

The rain repeller hat was a little small, but its field was adequate to keep all but the most violent gusts away from him. Maleus was looking for breakfast, having all but despaired of the fruit and fruit drinks that his auto-kitchen prescribed. Hopper's Nighthawks Diner never closed, but it was a long wet walk in the dark and empty streets. When he finally reached it its brightly lit interior was casting a shimmering warm glow on the wet pavement outside. Through the large glass panes he could see a row of booths, dotted with a few figures nursing coffee mugs or working over greasy plates. Maleus entered and sat in a torn booth nearest the door, hanging his hat on the adjoining hook.

A few minutes after punching in his order the Lipid Lovers Special arrived, along with a pill for assuaging its effects. Maleus dutifully popped the pill, washed it down with sips of steaming coffee, then ate hungrily. Between forkfuls of egg and sausage he noticed a familiar face getting up from a distant booth. It was Aroon Caurtoy, widely published member of the Order of Poets. Maleus had thought that he was off-world somewhere working on a sequel to his prize-winning *Rum Jungle Mine* collection, an anthology from his days in tropical northern Australia on Terra.

"Maleus, you're out early!" The huge man with a shock of red hair had appeared tableside, grinning. Caurtoy wore the poet's flame pendant like a badge over one lapel of his raincoat.

"And you?" Maleus managed, looking up at the looming figure.

"I'm on my way to an early meeting with Trimurty."

"Oh?"

"You know that the old boy has been talking retirement."

Maleus put down his fork and coughed into a napkin. "You're in line to replace him, then?"

Caurtoy grinned broadly, showing a lot of teeth. "Well, hope springs eternal, eh? Can't say that I'd turn it down."

"Well, good luck then," Maleus said, returning to his plate and spearing a piece of sausage.

"And how have *you* been these days, Maleus? I haven't heard much of you lately."

Maleus looked up at the grinning face

with no bitterness. The man was undeniably a good, maybe a great poet. "It's been tough lately," he said.

Caurtoy's bushy brows knitted, the grin fading. "Money or words?"

"Words," Maleus said without a pause.

"This has been called the Healing Couch," the petite woman was saying. "You must lie down and make your mind a blank."

It was a large divan of sorts, pale ice-blue in color, but somehow glowing with its own incandescence. The room air was uncomfortably cold. There was a plain office chair against one wall but otherwise the small room was featureless. Distantly, Maleus heard the muffled rumble of thunder. Outside, the morning storm was still raging.

For the first time Maleus felt a tremor of fear run down his spine. Up to now he had compartmentalized the event, as he had learned long ago to do for those endless childhood surgeries—a future unpleasantness that he could block out until they actually occurred. He smiled weakly. "Did you ever read *Frankenstein*, Dr. Fisher?" he asked as another rumble from the storm crashed outside.

"It's quite harmless, Mr. Taub. Many people have been helped here. No one has ever suffered any ill effects. I've used it myself."

Maleus reached out and touched the glowing blue object. It was soft and cool and made his fingertips tingle. "Can you tell me what's going to happen?"

The small woman placed a hand on his shoulder. "Everyone's experience has been unique. Once in the field of this device it somehow instantly analyzes your need and creates a program tailored to help you in some way. We are quite certain that the Teydurax do not want to hurt us."

"But how does it. . . ?"

She squeezed his shoulder gently. "We don't know how it works. Or even what its energy source is. When the field is on we've detected minor fluctuations in certain astronomical objects."

Maleus looked at her, startled. "*Stars?*"

"Yes." Her brown eyes twinkled and she smiled. "Immense power does seem to be involved."

"But power like that. . ."

"We don't know, Mr. Taub. Remember that the Teydurax seem to play with the fabric of space the way a potter works with clay."

Maleus suppressed a shudder. "But . . . physically, what's going to happen to me?"

Dr. Fisher shrugged. "Physically, nothing at all that we can measure. You will lie here asleep for, perhaps, fifteen minutes. Some patients have said that minor aches and pains disappeared after the experience. One subject claimed that a chronic backache was permanently cured. These would be beneficial side effects of the treatment."

"But what is the treatment, doctor?"

She gently guided him to the glowing blue. He sat and felt the cool tingling begin to spread. Gently, she lifted his prosthetic legs onto the couch. "Lay back, Mr. Taub," she said. "You are going on a journey."

Maleus felt himself shudder again, but this time it was from a sudden gust of cold wind. He opened his eyes and blinked at a row of dark stone houses. A very steep and narrow street of cobblestones lay before him, curving upwards between the stone dwellings that seemed imbedded in the rising terrain. A horse-drawn cart—Maleus had seen the Terran quadrupeds before—was plodding its way upward, finding footing in the protruding stones.

There seemed nothing to do but to follow it.

The climb was tiring. He heard voices, speaking Terran English in a strange and almost unintelligible accent. Laundry flapped from second-story lines overhead.

After a long climb he noticed a sign: "Black Bull Inn." There were loud voices inside the dark stone structure, but he walked on, following the cart around a sharp bend.

On his left he saw a church with a marker: "Haworth Church—Dedicated to Michael and All Angels." He was sorely tempted to enter, but resisted, aware that his attraction for churches was not driven by a need to worship, but by . . . what? Perhaps by a need to soak in the belief and reverence of others. He walked on, past a graveyard that met a well-tended garden. And beyond: a two-story building, likely the church parsonage. He felt drawn toward the stone structure, topped by a pair of chimneys—one at either end of the pitched roof. But he found himself walking past the front door and out into the somber land beyond the building.

A vast expanse of pale green and delicate lavender, in places tinged dark brown, accented by jutting black rock. The wind, which had faded from his consciousness, now became a tangible presence, roaring in his ears. It carried a delicate scent.

The matte of pale violet was a tough wild heather, he realized. And this was Terra. This was Yorkshire in England.

He walked on, knee-deep in the purple sea, intoxicated by the perfume of the wild plants. On the roar of the wind he heard the deep-throated bark of a large dog. Looking up, before him in the distance he saw the tall, slim figure of a woman in a dark dress. Then, nearer, he heard the loud bark again and a massive dog, unlike any he had ever seen in life, was pounding directly towards him.

"*Keeper, no!*" He heard the shout in the distance, and the huge beast stopped a few paces away, regarding him with suspicious growls, and looking back at the slim female figure that was slowly walking towards them.

"*Keeper!*" The dog—it was called a mastiff, Maleus now recalled—gave one more protective growl and then pounced back to his mistress to accompany her towards him.

As the dog and the woman approached, Maleus began to fully realize what was happening. This was the nineteenth century. And he was about to meet the authoress of one of the greatest novels he had ever read.

"He won't hurt you," she said. The mastiff was sniffing at Maleus' cassock.

"You're Emily, aren't you?" Maleus said.

"Emily Jane."

Maleus felt foolish, looking for words. "Miss Brontë, I am honored," he said.

The tall girl regarded him seriously. "You're a stranger here, sir. Your dress is like a clergyman's, but strange, and your voice is strange." Her penetrating eyes fixed upon his face. "How do you know me?"

"Your work."

"What work?"

"*Wuthering Heights.*"

There was a moment of shock and then her features hardened. "How do you know that?"

"It's difficult to explain."

"You must be Charlotte's friend. She tells everyone everything." The girl turned to go, dragging the dog by the scruff of the neck.

"No, don't go," Maleus said. "I'm . . . *your* friend."

The young woman looked back, still bent over the dog's neck. "No one is my friend," she said.

"But I know you," Maleus pleaded.

"How can you know me!" There was anger in the upturned face.

"I've read your book."

She let the dog go and stood up in the wildly windswept heather. Hair curls streaming, she regarded him with a set mouth.

"I've read *Wuthering Heights*," Maleus said, "not once, but many times."

"It's in my room. You're a fool to trifle with me! Come, Keeper!" And she began to walk away.

"Emily, no. The book will be published. It is good. It is great."

She didn't turn but continued to walk

away, leading the mastiff.

Maleus, desperate, found the words—a residual memory from some mental archive: "I cannot live without my life!" he quoted, "I cannot live without my soul!"

She stopped and turned, staring at him. The wind was singing in his ears. Finally, she said: "You *have* read it."

"So tell me, how did you come by that nasty scar?" he said. They were sitting in windswept heather and Maleus was stroking Keeper's massive brow.

"And just what bother is that of yours, Mr. Taub?" Emily's lower lip jutted as she regarded her forearm.

"No offense," he said. "It looks like a burn."

"It *was* a burn, if you must know. I did it myself with a hot poker once when a strange dog bit me." Emily's tight frizzy curls rippled in a sudden gust. "I could ask some of you, Mr. Taub." The blue-gray eyes regarded him.

"Then ask," he said, adjusting his tail stub beneath his clothing. "You won't believe."

"You dress strangely. You look and speak like a foreigner."

"I am that," he said. "You don't hold it against me, do you?"

Emily tore off a stalk and sniffed the lavender blossoms. "No," she said. "Even though I was born not five miles from here, I feel like a foreigner myself."

"Except . . . not here." Maleus gestured at the moorish expanse around them.

Emily threw down the stalk. "Not here," she agreed, looking up at the roiling sea of lavender. She turned her acne-scarred face toward him and her gaze was riveting.

"What are you, Mr. Taub? What star did you drop from?"

"Do I really seem that strange?"

"You know too much." Emily got up to a kneeling position in the soft grass. "You know my sisters and my brother. You know that my father's the local cleric with the Haworth living, such as it is. You know that Charlotte, Anne, and I published our poems under assumed names last year. You know about my brother Branwell's drinking . . ."

Maleus started to protest, but Emily waved him down. "It's true. Branwell is a runaway train. I love the poor, fated fool, but there's nothing anyone can do for him now . . ." Her expression changed from pensive to focused. "Who *are* you, Mr. Taub?" she said.

Maleus shrugged. "A traveler. A friend." He smiled. "A creature from your imagination, perhaps."

"My imagination?"

Maleus' tail accessed the quotation this time:

"I'll come when thou art saddest/ laid alone in the darkened room . . . /Listen, 'tis just the hour/The awful time for thee/dost thou not feel upon the Soul/A Flood of strange sensations roll/Forerunners of a sterner power/Heralds of me."

Emily looked at him for a long moment. "Did I write that?"

"You did."

"I thought it sounded familiar," she said, suppressing a smile that would have been wonderful. "Tell me, then, creature who knows my secrets, how will my novel be published?"

"Charlotte will send it out, under your Ellis Bell pseudonym."

"We made that up for our poetry volume. Currer Bell was Charlotte, Acton Bell was Anne, and I was Ellis."

"And when your novels are published the reading public will be speculating wildly about these three Bells. Who are they? Are they men or women? Are they all one person?"

Emily regarded Maleus skeptically. "You tell a good tale, Maleus. That you do. But if you're so smart, then tell me how many other novels am I going to write?"

Maleus felt a sudden chill that accompanied the latest gust of cold wind. He gazed into Emily's dark blue-gray eyes, feeling his heart sinking.

The hard-set mouth seemed to admonish his silence. "So, what kind of prophet are you, then?" She leaned forward a moment and reached out, almost—almost touching his hand. "It doesn't matter, sir. I know I'll die soon. You keep your secrets and I'll keep mine."

"Call me Maleus," he said, suppressing a shudder and welling tears. "You are a remarkable lady, Miss Brontë."

The fugitive smile flickered. "Thank you . . . Maleus. Would you like to see what I'm working on now?" She stood up and Keeper rose instantly.

Maleus looked up at her from the heather. "Your room in the parsonage?"

"Where else?" she said, offering her hand as he got up.

"Tabby's a little deaf. She used to make the bread, but I've got to look after it now. Walk softly so my loaves don't fall . . ." Emily was leading the way up a set of sandstone stairs. A large clock was ticking loudly at the landing. "My father is working on his sermon and Branwell is out, God knows where—Halifax, I think, with his portrait painter friend." They reached a short hallway. "Anne is tutoring with a family and Charlotte is visiting her friend Ellen. We're quite alone for the moment, Mr. . . . Maleus."

The room was very small and there were two beds. Keeper, who had followed them, laid his chin on one and reclined in a luxuriant pose on the floor.

Emily stood before a mahogany dresser, hands on her narrow-waisted hips. "I don't know why, but I'm going to show you something that even Charlotte hasn't seen." She reached into a deep drawer and, after some groping, retrieved a wrapped and tied packet of papers. With a pair of scissors she snipped the threads that bound them. "This is *Gondal*, Maleus, if you care . . ."

Maleus held the thick packet of papers, densely written upon in a minute hand. "You've been working on this with Anne since you were both children."

"It's our little world of wonders, Maleus."

"There must be a million words here," he said, flipping rapidly through the pages. This would be priceless in my time. Would you believe that I've actually heard of *Gondal*?"

"Tell me," she said.

Maleus searched his memory. "It all started when Branwell was given twelve toy soldiers. The four of you, Anne, Branwell, Charlotte, and you, Emily, you all started making up stories about the toy soldiers. Soon you began writing them down, making up tiny little magazines filled with minuscule print—stories of high adventure, war and tyranny, magic and mystery, passion and romance." Maleus licked his lips to catch his breath. "The tales of *Angria* were sustained largely by Charlotte and your brother, but eventually you and Anne broke away to create your separate world of *Gondal*."

Emily's mouth was set again, her silver-blue gaze seemed to bore into him. She extended her hand for the packet. "So you know, then. I thought as much. Angel or demon, whatever you are, what else do you know about me?"

Maleus could not bring himself to surrender the packet of papers. "I know that *Wuthering Heights* is somehow derived from the *Gondal* stories . . ."

"It is," Emily said. "And so is the story I'm writing now. But you likely know about that, as well."

Maleus felt the tears welling again and looked down at the packet, pretending to read. "No, Emily, that one escaped me. What is it called?"

They were stretched out on the two beds, Maleus pouring over the manuscript pages, Emily reading a Walter Scott novel and absently stroking Keeper's mammoth head.

Finally, turning over the last handwritten page, Maleus looked up. "This is more than good, Emily. There has never been a novel like this."

"Did it shock you?"

"Yes," Maleus admitted, "and not just because this is the middle of the nineteenth century." He held up the pages. "It's powerful. I still can't imagine how you are going to sustain it and end it, but these two hundred pages are just incredible."

"Why thank you, Maleus," Emily said, and this time the smile was sustained. "Taken from someone who dropped from a star, I should accept 'incredible' as a compliment."

"What are you going to call it?"

"I don't know yet."

Maleus was shaking his head over the sheaves in his hands. "You are so tough, Emily. To write of this . . ."

"Not so tough, Maleus. Everyone's got their masks. Mine is just a bit strange. Possibly, though, no stranger than yours?"

Maleus looked down, nodding.

"You haven't revealed very much about yourself, you know."

"I'm a Mendelkind."

"Is that some kind of religion?"

Maleus sighed. It would be easy to make up some kind of a story that might be convincing, but he decided otherwise.

"Emily," he said, "I'm about to tell you the truth, as far as I know it."

And he did.

"So you're sleeping on a couch somewhere among the stars dreaming all this?"

Maleus shrugged. "It would seem so."

"Does it feel like a dream? It doesn't feel like a dream to me."

"It's *my* dream, remember?"

Emily grew pensive. "True enough," she said.

They sat on the two beds in silence for a few moments. Finally, Maleus stood up and walked over, handing her the manuscript. "I think it's over," he said.

"The dream?"

"It's time for me to go back. I don't want to, Emily, but I think I must."

Emily looked at the papers, refusing to take them. "You are . . . going back?"

"I think so."

"Can you take me with you?"

Maleus shook his head. "No. Only in my heart."

An impartial observer would, perhaps, say that what followed was more remarkable than any wonder that had come before. At any rate, Emily got up, taking the manuscript, and kissed the strange man named Maleus. And when she opened her eyes he was gone.

She sat in the bedroom awhile, then she took out paper and pen and wrote "My Comforter" with lines that ended:

And yet a little longer speak,
Calm this resentful mood;
And while the savage heart grows meek
For other token do not seek
But let the tear upon my cheek
Evince my gratitude.

4. The First Point of Aries

What is love? 'tis not hereafter;
Present mirth hath present laughter.
What's to come is still unsure:
In delay there lies no plenty;
Then come kiss me, sweet and twenty,
Youth's a stuff will not endure.

Twelfth-Night
—William Shakespeare

"Mr. Taub, are you all right?" It was Dr. Fisher's voice from outside the restroom door. Maleus was staring at his own gaping image in the bathroom mirror, having discharged his breakfast a few moments before. "Yes," he said, not really believing it, "I'll be right out."

He washed his face in the basin and let the warm air from the driers play over his features. "You could almost have been her grandfather," he gasped in a whisper at his wind-blown mirror image.

Distantly, he heard the retreating rumble of a thunder crash.

That was the autumn of 1846, he thought, extracting the date from his tailchip. *She was . . . 28 years old.*

Maleus had to smile. *Imagine that society's reaction to the idea of bringing an unaccompanied gentleman into the girl's bedroom in the parsonage.* But Emily Brontë was one of those unique, powerful personalities, beyond convention. Yet she was strangely shy and reclusive. Or, perhaps, not shy, but calloused by disappointment with life.

"Mr. Taub?"

Maleus emerged and was led to Dr. Fisher's darkened office, where he sat in the chair he had occupied the day before.

"There is no way for us to know what you experienced on the Healing Couch unless you tell us," Dr. Fisher was saying.

Maleus regarded the little woman with eyes that were wide and a little wild. "Just what was that that I just went through, Doctor?" he demanded, for the moment ignoring her question. "A dream? A hypnotic trance? Some farraginous mix of my own thoughts, knowledge, and memories? Or was it real, as it seemed to be? Did I travel through time?"

Dr. Fisher adjusted her glasses. "Do you want something, Mr. Taub? A trank or a drink? We have them here."

"No." Maleus pulled at the loose skin under his chin. "Yes . . . brandy."

In a moment the snifter sat before him, having risen from the chair arm. "I know that dreams can seem very real . . . convincingly, undeniably real . . . and still be just dreams. I've had . . . lots of dreams lately . . ." Maleus raised the snifter and sipped. It seared his throat. "But this was . . ."

"Different?"

"Did I really experience something . . . interact, just as I'm sitting here talking to you . . . or was it all an elaborate dramaturgy?"

"'What thin partitions sense from thought divide?'"

"Yes. I need to know, doctor. Did I really go somewhere?"

Dr. Fisher put her feet up on the seat of her chair and hugged her knees. "Well, Mr. Taub, let's begin with this: what did you bring back with you from your journey?"

There was a long silence, during which Maleus pondered.

"My hands are empty, but my tail is full," he said at last.

"Just how much did you know about the Brontës before . . . embarking on your journey, Mr. Taub?" It was hours later and they were at a nearby restaurant. The storm had turned into an afternoon drizzle. Maleus was almost hoarse from talking. Now he felt emotionally spent, watching drops fall from the bistro awning.

"That's a very good question, doctor. I've been trying to remember. I've read all their fiction. Not just Emily's *Wuthering Heights*, but Charlotte's *Jane Eyre, Vilette, Shirley,* and *The Professor* and Anne's *Agnes Grey* and *The Tenant of Windfield Hall.*"

"How about biographies?"

Maleus looked at her, drumming his fingers on the unread tablescreen menu before him. "You know there was something . . . Elizabeth . . . Gaskell's *Life of Charlotte Brontë*. They were contemporaries. I could have gotten a lot of details from that work."

"What about—what did you call it *Gondal*?"

"There were two major works of juvenilia."

Dr. Fisher knitted her brow.

"Fiction that the three girls wrote together with their brother Branwell when they were children," Maleus explained. "The first world they created was called *Angria*—a fictional kingdom somewhere in North Africa. That writing eventually came to be dominated by Charlotte and Branwell. Emily and Anne broke away and created their own world of *Gondal*—an island in the North Pacific Ocean."

The little lady regarded him from across the table. "These . . . juvenilia have survived, then?"

"*Angria* has. *Gondal* is gone." Maleus felt something sink within him. "When Emily died—that would be about two years after I met her—Charlotte burned all of *Gondal* and all of Emily's second novel."

"And all of this is in the Gaskell biography?"

"No, doctor, none of it is."

"But you know that it's true?"

Maleus looked up, disturbed but certain. "Yes, I know that all of *Gondal* and the second book were destroyed. I must have read it somewhere."

"Why would Charlotte do that?"

Maleus shook his head, sadly. "Possibly because she felt that the novel was too powerful or controversial for mid-Victorian-era sensibilities."

"But *Gondal*?"

"I didn't have the time to read but a small fraction of *Gondal*. There were hundreds of tiny, handwritten pages, but . . ."

"But . . . ?"

Maleus met her eyes. "It just might have contained the germ of the plot of *Jane Eyre*."

"You are saying then that Charlotte was afraid of being accused of plagiarizing the conception of her sister?"

Maleus shook his head. "I don't know. I know that I felt greatness in Emily—in her *Wuthering Heights*, in her second novel, somehow in her . . . presence. It sickens me to think of her writings being committed to the flames."

"You read the second novel?"

"Yes. It wasn't finished."

"And you can reproduce it . . . from your biochip?"

"Yes." Maleus faced her with an almost pleading look. "Doesn't that mean something real happened to me . . . and not just some kind of hypnotic dramaturgy designed to cure my writer's block?"

The tablescreen beeped for the hundredth time and Dr. Fisher snapped at the glowing button. "Do you know what you want?" she asked.

"Yes," Maleus said, dreamily, "but for dinner I'll have the Special."

"Two Specials," Dr. Fisher said and the screen finally darkened.

"Mr. Taub, we've been studying the Healing Couch for twenty years and there is always this ambiguity: what part is real? Let me suggest something to you. Suppose that we run a crude calculation of the age of Terra light falling on this world."

"You mean the year . . . ?"

The little lady smiled and nodded. "The departure time for light-speed limited particles that originated from Terra and are arriving now at Millikan's Drop." She tapped at the tablescreen.

"Don't tell me, doctor—1846."

"Yes."

"Just what exactly does that mean?"

Dr. Fisher leaned across the bistro table and tapped the back of his hand with a lustrous nail. "It means, Mr. Taub, that if you could find Sol in a telescope it would appear exactly as it did in 1846. And if you could image Terra and England and Yorkshire, Emily would be there."

"I still don't quite understand."

The diminutive lady smiled. "Perhaps it means that the universe is not so cold and austere as we sometimes imagine," she said. "What if life, all life, were somehow a radiator?"

"A radiator?"

"Suppose that life processes—chemical and physical—produced a signal, a very faint signal. We've learned to hear the loud sources—the quasars, the supernovas, the pulsars. But suppose that the Teydurax have learned to listen to the very faint undertones—the rumble, hum, and hiss of living beings, each with its own special signature."

"But how could I have . . . interacted with these . . . emanations from the past? How did these signals allow me to speak with Emily Brontë?"

"I don't think that you did. You only appeared to, guided and coached by a very sophisticated program."

"Then you're saying that it *was* dramaturgy: I didn't really meet Emily Brontë?"

"As you said, you interacted with her emanation. It was real, but one-sided, except, perhaps, in that wave-packet of information that is now expanding outward beyond this world."

"People don't live in wave packets of information!" Maleus surprised himself at the edge his voice had taken. "Just how do you know all this, Doctor?"

"I don't," the lady said, raising empty palms. "It's all pure speculation. But we've seen enough cases with the Healing Couch to suggest something like this explanation. No historical paradoxes have ever been traced, for example."

"But what about those dimming stars? Where is all that power going, if not into some kind of time travel?"

"First of all, Mr. Taub, we don't know what kind of power something like time travel would require, even if it were possible. And second, if you really had traveled through time, where is the proof?"

Maleus regarded the anachronistic glasses and the brown eyes behind them. "Doctor Fisher, I *have* proof. I have most of the text of Emily Brontë's second novel—a book that isn't supposed to exist any longer."

The glass lenses winked at him, catching light from the overheads. "What's the title?"

"It is untitled."

"You can reproduce it?"

"Yes, most of it."

The lady took a thoughtful sip from a sweating glass of ice water. "It's still not proof that you met Emily Brontë, Mr. Taub. It just means that you read her manuscript. Don't you see? We might image Terra in 1846 with some hypothetical telescope and extract information from that image—masts on a sailing ship or smoke from a chimney . . ."

Maleus frowned, shaking his head. ". . . Or a manuscript tied with a string and locked in a drawer in a closed room?"

The steaming plates arrived with a click from the sideboard. "You are drawing the telescope metaphor too closely, Mr. Taub. You are thinking of photons of visible light." Dr. Fisher picked up a fork and draped a napkin over her knees. "If the Teydurax can intercept neutrinos, they very well might be able to intercept and interpret a host of even stranger phenomena."

"Light-speed-limited phenomena?"

"Apparently so."

Maleus shook his head again. "Did you ever hear of Occam's Razor, Doctor?"

She looked up with a poised fork. "'Entities should not be multiplied unnecessarily'?"

"In other words, the simplest answer is usually the correct one."

She began to eat. "You know that some theorists have conjectured that time travel is impossible."

"Only two centuries ago they were still saying that about transluminary travel."

Dr. Fisher pointed at his plate with her fork. "You'd better eat, Mr. Taub," she said.

"She's seaworthy, that she is," the bearded merchant was saying. "But if you get into any problems just hit this here switch." With a snap the central control panel lit up in the little skiff and the boat levitated a few centimeters out of the water. "You can fly her in on 'manual' or just hit 'shore'." The man wiped his white-bristled chin. "Now, how many hours will you be needing, sir? We have special half- and all-day rates."

"Two hours," Maleus said. "I'm not going far."

The man looked disappointed but took Maleus' money readily.

In a few minutes Maleus was alone and adrift, then purring softly out toward the watery horizon.

There was a time, several years ago, when Maleus would do this fairly often. Just rent a boat and go out into the bay until the shoreline was a distant blur and the water stretched in most directions to a seamless curve. It had been a time to think, often a time to write.

Now the sky was uniformly overcast, though the rain had stopped. Maleus guided the small boat toward the deep channel. When the shore was just visible he cut the engine and dropped an anchor beam. Then he raised his feet to the top rail and leaned back in the comfortable chair, lacing his fingers behind his head.

"She wants me to go through it again," he said, out loud. A glidingtail skimming the waves nearby answered with a high-pitched cry. "Tomorrow. That doesn't even give me a chance to consider what has already happened. I wanted to study the text of the second novel. And try to piece together what little I have of *Gondal*..."

The waves were rhythmically rocking the small skiff. Maleus felt himself sinking into sleep, drained by the emotional strain of his experience. He shook his head and wished for coffee, but there was none to be had.

Silently, he wondered just what the Teydurax, whoever, or whatever they were, thought about the creative impulse. Back in his tutored student days he had come across a quiz in a newser file titled, "Are You Scientifically Literate?" It was a series of very basic questions with the implication that if you didn't know this stuff you were a lummox: "What are the four basic forces?" "Name the base pairs in Terran DNA." "What is the cube root of 125?" He had immediately countered by making up his own quiz, entitled, "Are You Literate?" He even remembered some of the multiple-choice questions:

Guernica is: a) a tone poem by Orff; b) a sculpture by Brancusi; c) a painting by Picasso.

Ophilia was: a) Lear's daughter; b) Laertes' sister; c) Lady MacBeth.

Heathcliff appears in: a) *Wuthering Heights*; b) *Middlemarch*; c) *A Tale of Two Cities.*

When he had shown the quiz he'd written to a programmed engineering tutor he had gotten the software equivalent of a knuckle-rap. The program protested that the test was unfair. The questions were about made-up human things of no consequence to the universe.

Maleus regarded the rocking horizon between his sandals. Of course, a humanities tutor would have reacted differently.

As far as he knew, the Teydurax had shown no interest in the arts. How could they heal a poet with writer's block if poetry, or the arts in general, meant nothing to them?

And yet, Maleus thought, *a superior race of beings must know its limits. That is certainly one of the sources of the artistic impulse in humans. The troglodyte is hungry. He worries that he can't kill enough game to feed his family. And so he draws the deer and the bison's image on the wall of his cave, as a tribute, a charm, a supplication, a prayer. We see the immensity of the stars and the unplumbed depths within ourselves, we fear death and feel love, and so we must dance, or sing, or paint, or write. Art is everywhere, but the highest art comes where analysis fails.*

Do the Teydurax know that about us?

That... powerful soul... What else could she have written if she had lived? Maleus could almost again smell the heather in the blowing sea-spray. *So strong... and so alone...*

The sun was getting near to the horizon and would shortly put on a show for him, through thin breaks in the cloudbank. "Will I go back to her?" Maleus wondered out loud. "Or will I go somewhere else?" Already he was feeling a sense of loss. Somehow, he knew that he would never see Emily Brontë again.

The Pennine Chain of mountains

stretched out below him, running from the Derbyshire peak to the Scottish border. The little village of Haworth appeared nestled on a steep hillside cut by the River Worth on one side and a tributary on the other. He appeared to be flying at a great height. Then, slowly circling, he saw the moors, windswept and fragrant. There was Wuthering Heights, and in the valley, just below it was Thrushcross Grange. Below, Heathcliff and Catherine Earnshaw love each other with a frightening power that transcends death itself. Below, the parsonage, an early Georgian two-story, where Emily had dared to dream.

It was dark and the skiff was bobbing in a prevailing westerly wind. Maleus shook his head to clear it and dropped his legs from the railing. He had dozed off and night had fallen. Lately, it seemed to him that life had become an endless succession of dreams. And now he was overdue on the lease of the boat. Shore was undoubtedly that line of lights on the horizon, but sleepy, shaken, and lacking confidence, Maleus dutifully pressed "shore."

5. There Are Watchers in the Skies

Jenny kissed me when we met,
Jumping from the chair she sat in.
Time, you thief! Who love to get
Sweets into your list, put that in.
Say I'm weary, say I'm sad;
Say that health and wealth
have missed me;
Say I'm growing old, but add—
Jenny kissed me!
—Leigh Hunt

Maleus awoke to sunlight and music, having tapped into an old program before crashing to bed late last night. The music was one of his personal favorites—a piano piece—*Trois Gymnopédies* by Erik Satie. It happened that the sunlight was real, from a polarizing filter, but the program would have provided an artificial version if the morning's weather was not obliging. There was something about sad music and cheery sunlight that flirted with the profound. He sat up and smiled to himself. "Ignore those dreams," he muttered with a wry smile. And then, raising his hand like a naïve student: "Does that include this one?"

The room system responded with another floating question mark.

Maleus brushed back his hair and dipped his fingers in the brine bowl. Touching his closed mouth he felt the salty liquid seep between his teeth. "To taste . . ." he whispered, ". . . the tears . . ." The phone chimed. ". . . of the day . . ."

Still in his nightwear, he waved the camera off, then self-consciously looked down at his leg stumps on the basin ledge. The image of Dr. Fisher appeared before him. She was wearing a brown and beige tunic, and there was a large amber comb in that beehive hair mass. "Mr. Taub, I'd like to get started a little earlier this morning. Could you possibly be here by nine?"

"What is the hurry, doctor?" He realized that his voice sounded hoarse, and cleared his throat, still tasting the salt. "Frankly, I've been wondering just what is being accomplished . . ."

"In our experience a closely spaced follow-up session with the Healing Couch is often all the treatment that is required."

"You mean this is the end of the . . . therapy?"

"Very likely one more session is all that will be needed."

Maleus read out the time from his tail chip. He would have to get dressed in a hurry and catch a curricle air cab, but he could make it. "Yes, doctor, I'll be there," he said.

"Fine," she responded, smiling. "I'm convinced we're making progress, Mr. Taub. I'll see you soon, then." And the image faded.

The cabbie was a Houdan and a talker. The lupine alien had the annoying habit of turning his head around to face Maleus as they climbed through buildings and traffic.

"Shouldn't you be watching where we're going?" Maleus said at last.

"What? Oh, this thing just about flies itself, sir." The cabbie tipped his cap back and gave Maleus a wolfish grin. "Collision avoidance programming—" A wing-tip scraped a roof edge and sent somebody's potted plant hurtling downward. "—is getting a little buggy, I notice . . ." The cabbie grabbed the controls for a moment, then looked back again. "Babs, you said, sir?"

"Yes."

"You know I have a brother who works in Babs."

"Really?"

The cabbie turned around again. "Teydurax Studies. He sets up the environmental control for those rooms where they keep all those artifacts."

Maleus realized that there was no way to avoid a dialogue here, so he said, "Does he talk much about it?"

"Oh, yeah. Well, you know some of that equipment they have there is pretty fantastic. He told me that they've got something there that can record your personality on a little thing like a music pellet. Play it back to you then through a computer, or dump it into an android. They've got something that can shut you down—" He whistled and snapped his fingers. "Dead. Like that. And then start you up again, tomorrow, or a century from now. And none the worse for wear, he told me." The Houdan sucked a canine. "And my brother said they've got something there that lets you talk to dead people."

"No kidding?"

"Hey, my brother wouldn't kid about something like that."

The Tower of Babs swam into view in the windscreen field. The curricle began to circle it and descend, joining a dozen or so other air cars that were already locked in the valet parking beam.

"Ah, so tell me, sir, if you don't mind . . ." The cabbie grinned back at him. ". . . what's your business at Babs this fine morning?"

"Talking to the dead people," Maleus told him.

"Have you tried at all to write, Mr. Taub?" Dr. Fisher was saying.

"No, Doctor. Things have been moving pretty fast."

The little lady patted his shoulder. "Perhaps after today you can try to write. Things might begin to go better for you."

Maleus took a strange comfort in the physical contact, even while suppressing a shudder from the room's cold air. "You know, it's not a matter of just writing . . ."

"Of course, Mr. Taub, it's a matter of writing well—in a way that feels right to you. That will come when you've balanced your life—resolved some issues."

He thought to protest that he had no issues, but instead he said, "I suppose I am to recline here again?"

"Yes, Mr. Taub, lie down, please . . ."

Trees. Dazzling gold and red leaves shimmering. A windswept sunny vista: white-painted wooden houses with gardens and lawns. And once again the equine quadrupeds—a team of four pulling a large open wagon laden with farm produce.

This was not Haworth, Maleus knew. This was not England. His heart sank with the confirmation of the expected loss. Somehow, he had known that this second journey would be different.

But where was he now?

He began to walk without purpose, looking about a small town—somewhere on Terra in the mid-nineteenth century. He noticed street signs written in English: "Amity," "Main," "North Pleasant." He guessed it was the United States. And if these dreams were light-speed-limited it was the autumn of 1846.

A fledgling country, Maleus thought. *Still probably looking over their shoul-*

der at Europe. The slavery thing would still be rampant in some places—that infamous Fugitive Slave Act is still the law of the land. But the air is cool, this is the north. And that Civil War they had is still a decade and a half away.

Maleus looked around at the neatly landscaped lawns, the small shops and offices, the white-steepled churches. And then, in the distance he noticed a larger building. Walking towards it, he reached a sign: "Amherst Academy." That seemed to be familiar, somehow, but he couldn't place the reference.

"Can I help you, sir? You seem to be lost."

It was a small teenage girl. She had lovely, warm brown eyes and beautiful chestnut-red hair, done up in ringlets. She had one of those faces that wavered between plain and pretty, as if in another year it could go either way.

It suddenly fell into place for him.

"Young lady," Maleus said, "how would you like me to guess your name?"

"Only if I can guess yours, too," she said, hugging a pile of textbooks and grinning broadly.

Maleus smiled too. "You start, then."

"All right. I'll say: 'Vincente'."

"Wrong. My turn," Maleus said. "I'll say . . . 'Emily'."

The girl looked at him, silently, a real laughing grin playing at her lips.

"You must know Ben Newton—the clerk at my father's law office."

"No, I'm afraid I don't."

"Then you know Principal Humphrey at the Academy."

"No, I don't know him either."

The girl sniffed at a white flower she had pinned to her pink dress. "You have my name, then, sir. I know not how. But how will I know yours?"

"I'll tell you," Maleus said. And he did.

The girl did a little bobbing curtsy. "Are you a writer, sir? My friend Susy knows ever so many writers. Perhaps it was she who told you my name?"

"No, Emily," Maleus said. "I'm a stranger here." He looked into her unblinking auburn eyes. "But you are correct. I am a writer . . . or I was . . ."

Emily's youthful face brightened noticeably. "And what do you write? Is it poetry?"

"Yes," Maleus admitted. "When I can."

"Oh, I so wanted to be a poet. But Master Humphrey said I must read much more before I try."

Maleus raised a hand. "Before we go on, may I just confirm two things, Emily?"

The girl regarded him silently.

"This is Amherst, Massachusetts. And you are Emily Dickinson."

"Sir, you have all the answers, but I know nothing about you."

Maleus shrugged. "You know that I'm a poet. I'm also a traveler. I came from a great distance to see you."

"To see me?" The girl shrank back a step.

"To meet you."

"And why me?" she asked.

Maleus paused in thought. "Maybe it's because we have something to say to each other."

"I can't imagine what that could be. I have never written poetry."

"You will."

A beautiful smile lighted her face. "And how do *you* know that?"

"Would you like me to quote some of the poetry you will write? I know several of them by heart."

"No."

The answer caught Maleus by surprise. He had been mentally sifting through some of his favorite lines from the "Belle of Amherst." For the most part they were sad, soul-wrenching lines, written from a life of solitude. Now the stark contrast struck home with him. His image of Emily Dickinson was the middle-aged recluse who only wore white. "May I ask how old you are, Emily?" he said.

The girl flashed another bright smile. "Why, sir, I'll be sixteen come this December."

Maleus remained thoughtful.

"Don't you see, sir? I'm much too young to have my fortune told. Father says such things are sinful." She looked away, rocking the books in her arms. "But I just think it would spoil all the fun if someone were to tell me what was going to happen."

Maleus found himself smiling at the young girl's innocent charm. "I certainly don't want to spoil anyone's fun," he said.

In the silence that followed he found himself following the girl's gaze, which rested on a nearby grassy swath arrayed with headstones.

"Emily, do you live near here?"

"What? Oh. Yes, right here, as a matter of fact." She pointed to the large house behind her. It was a brick two-story with a small portico supporting a railed porch. "Father says that some day we'll move back into the family homestead on Main Street." She nodded to the tombstones. "My room's window faces that West Street Cemetery. A boy that I went to school with was buried there last week."

"I'm sorry."

"The fifth . . ."

"What?"

"It was my fifth classmate to go to God."

Maleus could only say, "That's really sad."

"It's the consumption," she said, pointing to her chest. "It gets them when the cold air comes. Mr. Hitchcock says that we should be happy for them, as they are God's early harvest." She wrinkled her brow. "I think he means that they were fortunate to die before they could do something wicked."

"Do you believe that?"

Emily was silent for several minutes. "No," she said, finally. "Ben Newton—he's a clerk in my father's law office and awfully smart. He says that we each trace a path through time and space, like comets or stars. Some of us are hot and showy, giving off sparks and light. But some of us, most of us, I guess, are dark and invisible, just swinging through the vast darkness, unseen and unheard. And some of us have a long path, and some a short one . . . But God sees us all, and loves us all. He knows us better than our Mamas . . ." Emily giggled. "Ben said that." She looked pensive again. "And then, when we die—all of a sudden— all of the craziness will make sense again. That boy who died last week . . . he knows now, knows what the meaning of all this is."

Maleus found himself enmeshed and awed by the young girl's words. He could only offer silence, which she readily accepted.

"It's over here," Emily was saying as she led him through a maze of stone monuments. Maleus had followed her somewhat reluctantly when she insisted on showing him the fresh grave. Birds were singing and somewhere an insect, somehow hanging on from warmer days, had begun to chirp loudly.

"I was in Boston when he died," Emily said, looking back at Maleus. "My father thought that I needed to see something outside of Amherst before the new school semester started. I spent over a fortnight there with my aunt and uncle and cousins. Fanny and Louisa showed me ever so many things—Bunker Hill, the Chinese Museum, the State House . . . and Mount Auburn—that's a much bigger cemetery than this . . ."

Emily kept up a brisk pace, talking without a pause. "My girl friend, Abiah Root, wrote to me that this boy had died. The three of us were in class together last term. He liked botany." Emily turned and smiled weakly. "I like it too."

"Emily?" Maleus nearly tripped, as he tried to read some of the names and dates and still keep up with the teenager.

"He's here," she said suddenly. They had arrived at a fresh mound of earth adorned by three withered flower bouquets. "I should say his body is here." Emily hugged her schoolbooks. "You had a question, sir?"

"You can call me Maleus. I just wanted to ask if you miss him a great deal. I mean, were you very close friends?"

Emily stared at the gravesite without looking up. "I hardly knew him at all," she said. "We never spoke that I can remember." Her thin shoulders gave a little shrug under the pink dress. "That's sad, too, isn't it? I mean, we might have become friends. He wasn't very good at it, but he liked botany." She looked up at Maleus. "Most boys don't like botany."

There was a prolonged silence dominated by the throbbing whirr of a lone insect in one of the surrounding trees. The sun was warm, but the light breeze carried a chill.

"It's all just so sad," Emily said at last. "For us, I mean, the living. We're always saying goodbye. I don't know how I shall ever say goodbye to my father and mother."

Maleus' thoughts were drawn back to that grave on a promontory on Sama Asfar, where seven centuries from now and hundreds of light-years away he buried his mother.

"When you lose someone, anyone, some part of you goes with them," Emily said.

"You are right, Emily. You must write about it." Maleus was speaking as much to the girl as to himself.

She looked directly at him, and her brown eyes were moist. "You know, we shouldn't be sad if we know that they are with God."

"I suppose not."

"If God exists, then nothing else matters."

Maleus nodded his head, sadly, listening to that thin singing from the trees. Dusk was gathering around them.

"But also," Emily continued, "you could say, if God does not exist, then nothing else matters." She hugged her books like a schoolgirl, but suddenly looked much older in the dimming light. "I know it's wrong, but I sometimes think we humans are creatures born to doubt."

"Maybe that's why we need one another so much," Maleus said, a little surprised at his own words.

Emily slowly looked up again, directly at him. "Who are you, sir?" she said, and it was clear she didn't mean his name.

"You must write poetry, Emily."

"But . . . who are you, Maleus?"

"I'm nobody," Maleus answered, feeling himself fading, as he recited the line. "Who are you?"

Emily felt a cool breeze that sent a shiver down her delicate frame. The fact that the strange man was gone somehow did not surprise her. Life was a long chain of partings. Hugging her schoolbooks, she began to slowly walk home alone.

6. Many Worlds

Nothing is too wonderful to be true.
—Michael Faraday

"Suppose, Mr. Taub, that the universe were one vast, inconceivably complex wave function." Dr. Fisher was in her characteristic calf-hugging pose behind the large wooden desk. "And not just one universe, one time-line, but an infinite number of time-lines, an infinite number of universes, tracing all possible events throughout time. Physicists and philosophers have been speculating about this idea for centuries."

Maleus was still reeling a little from the Healing Couch encounter. "Those arguments always sounded a bit too deterministic for my taste, Doctor. Isn't there an element of fatalism embedded in that idea? It seems to make free will an illusion."

Dr. Fisher popped a pink lozenge and as she did Maleus noted that her hand trembled slightly. "If the wave function of any one universe is infinite, then free will could be accounted for. If the wave function is bounded, then human will shares those limits."

Maleus shrugged. "So what are you suggesting? That I traveled between these wave function universes? It sounds like just another elaborate construction to deny the existence of time travel."

"I don't think travel between time-lines is possible either, Mr. Taub—at least not given the physical laws within *this* universe. I just wanted to point out that there may be time-lines with different physical laws in which you really did meet and know Emily Brontë and Emily Dickinson. It may even be possible that the Teydurax program somehow knows that."

Maleus shook his head, stubbornly. "You're forgetting Occam's Razor, Doctor. The simple explanation is usually the correct one."

Dr. Fisher's glasses slid down her nose as she leaned forward, and she pushed them back. "But it *is* fairly simple, Maleus," she said. "You interacted with the wave-packet called Emily Brontë as it passed Millikan's Drop, and then you interacted with the wave-packet called Emily Dickinson. Then you went on your way. The particular fraction of those emanations that passed us have been changed, permanently changed. But the encounter interface is minuscule compared to the expanding spheres of Emilys that emerged from Terra in 1846."

Maleus reflected on the image for a moment. "So you're saying that I changed a little slug . . . a tiny spherical section of history as it went streaming past this planet at the speed of light. And now . . . that changed segment will expand behind us. But it will always be just a flyspeck of change on the immense expanding sphere of history from two days in the autumn of 1846 on Terra."

The little lady nodded. "We have reason to believe that something very much like that happens with the Couch."

Maleus sunk deeper into the cushions of the yielding chair. "Then it all takes on the characteristics of dramaturgy, after all—a play staged for my benefit."

Dr. Fisher smiled weakly. "Is there anything really wrong with that, Maleus?"

He found it difficult to meet her eyes. "You weren't there," he said softly.

"No."

"Those . . . encounters were both so real . . ."

"That may be just the point. The Teydurax may have found that we humans learn and heal best by interacting with certain scenes from the past."

Maleus looked up with quiet urgency. "But why not time travel?"

Dr. Fisher shrugged and smiled. "It may be impossible. It may be impractical. It may be that too many paradoxes are created."

"Instead of interacting with past events as they happened, I interacted with a light-speed waveform that past events generated centuries ago?"

"I think so."

"And changed it in some way . . . So that if I could climb aboard a fast transluminary ship and follow the expected path of that expanding waveform segment to some distant corner of the galaxy, and wait for it to arrive . . ."

"With the help of Teydurax technology, you would be there with the two Emilys, at least for an interval. Yes," she said, "I think so."

Maleus was silent for a long moment, and when he looked up the lady was looking at him, expectantly. "And how has all this affected me?" he said. "I suppose that's what you are waiting to hear?"

They were back in the same bistro, except now the weather was clear and night had fallen. They were seated at a candlelit circular table on a small outdoor patio. There was a light breeze and a vast backdrop of stars. They had finished their dinners and were sipping at vintage port.

"I don't know if Emily . . . the second Emily, I mean . . . I don't know if she caught my sense of surprise. But she was just so different from what I know she later became."

"A lonely spinster. That was a pejorative term, I believe." Dr. Fisher cleared her throat and took a sip of port.

"Yes," Maleus said. "'The Belle of Amherst' who shunned most adult contacts . . . and wrote some of the most moving and unconventional verse."

"The sixteen-year-old Emily was nothing like that?"

"No. She was open, uninhibited, anxious to experience all of life."

"Was she very different from the twenty-eight-year-old Emily Brontë?"

Maleus pondered a bit, swirling the wine in his glass. "Perhaps not so different. They both seemed . . . resigned to personal loss." Maleus rubbed his chin. "If you compare them both as mature writers you see Emily Brontë as reserved but strong—calloused by life; and Emily Dickinson as withdrawn and sensitive, silently nursing an inner pain. But they were both deeply passionate women who wrote with elemental force."

Dr. Fisher looked across at him with a searching expression. "Mr. Taub, do you see some reflection from the lives of these two women in your own life?"

"Doctor, are you asking me if I'm lonely?"

The little woman appeared a bit flustered by his direct stare. She covered her reaction with another sip of port. "The Teydurax Healing Couch arranged these meetings for some reason, Mr. Taub. We have found in past studies . . ."

Maleus was touched by the woman's embarrassment and felt an impulse to interrupt. "You said that you had used the Healing Couch yourself once, doctor. What was that experience like?"

It may have been the dim flickering light from the candle but Maleus thought he detected a slight blush. "It was about ten years ago," she said. "I was a postdoc in residency here at the Institute. We were all naturally expected to undergo the Healing Couch therapy ourselves before beginning our practice."

Maleus watched the dancing light play over her features as she spoke. *What have I learned?* he wondered.

"My fiancé, a fellow student, had recently died in a diving accident. I spoke with him as a six-year-old boy in a schoolyard on Ho Roka, where he grew up. I . . . told him that I was a friend of his mother."

"Did that help you deal with your loss?"

She paused a few moments before answering. "It gave me the strength to go on alone. Perhaps it was knowing that he died with no unfulfilled dreams."

You told Emily Dickinson something. It had to do with being human.

"What are *your* dreams, Maleus?" she said after a long silence.

They both had been speaking very personally for two days now. Was it only wishful thinking to believe that her interest in him might now be just a bit more than clinical?

"I want to transcribe Emily Brontë's second novel. Publish it along with a personal narrative about my meetings with those two women." Maleus watched starlight reflected in the dark swirling wine in his glass. "I think that I will be able to do justice to the memory of those two great writers."

Doctor Fisher smiled, and this time there was no embarrassment but a genuine warmth that reflected in her brown eyes. "And poetry, Mr. Taub? You *are* a poet . . ."

Yes, it's a big universe, maybe a big universe of universes, and we haven't a clue as to what it's all about. That's why we need each other so desperately. There's at least a poem in that.

Maleus blinked several times with the woman's question still hanging in the air. It seemed one of those awkward moments where something unrelated suddenly took on great meaning. Somehow, he felt that he dare not hesitate. "What's your first name, Doctor?" he blurted.

Doctor Fisher sighed, still smiling warmly. "Mr. Taub," she said, "I thought you would never ask." ■

Illustration by Vincent DiFate

Clay's Pride

Bud Sparhawk

Contact can be a tantalizing glimpse, and even clear facts get filtered through layers of human deviousness. . . .

The scream of the proximity alarm awoke Wilburn from his dream of the cloud-tipped mountains of home. He slapped the panic switch to regain control from the automatics and tried to make sense of the display. Maybe it was another chunk of debris, he hoped.

The jumbled returns from the long scan gave no indication of what was coming, only that there were more than one and they were distributed within a 100,000-kilometer cube. Even when he boosted the gain he still couldn't resolve the returns into anything that made sense.

Well, that wouldn't matter for long. At the rate the objects were closing they'd soon be in visual range. He unlimbered the scope and adjusted it for max range. There, that bright fuzzy spot must be the target cluster. He kept the scope fixed on the spot.

"Holy mother of God." He could hardly believe his eyes, as the image grew swiftly larger. The cluster appeared to be shattered icebergs, all sharp edges and random shapes. But they couldn't possibly be icebergs, not out in deep space. Those sharp ridges must have scattered the signal. No wonder he couldn't make sense of the scans. What could they be?

"Encountered some anomalous objects," he encoded into the neutrino burst message pad. "Will transmit a visual." He thought for a minute and then added, "Appear to be ice shards."

Message sent, he prepared to image the advancing objects. Strange, they looked a lot closer than he'd initially thought. A quick check of the scan confirmed it. They were accelerating, which meant they were under power—under control!

Realizing the importance of his sighting, he fumbled with the imager, aimed it at the largest shard, and took a long exposure. Even though the objects appeared to be glowing he wanted to capture as much light as possible.

The strangest thing about the resulting image was a blurry area at the lower edge, as if something had passed between him and the larger object during the exposure time.

Wilburn just had time to glance out the port to see what it might have been when the universe exploded around him. He floated among the wreckage of his ship, unfeeling of the ice forming in his veins, of the gases rushing from every orifice of his body, unseeing with his frozen eyes as the shards passed him by.

Commander Simon Clay, the senior Fleet officer on board, checked the readouts from *Pride*'s watch stations and made a notation in the log. *Nothing to report*, he wrote, as completely expected. Nothing ever happened on these training flights.

The flight profile was always the same: They'd take a series of safe, half-light milliblinks out from Dzhou and run a straight survey sweep for three days. At the end of the survey they'd go through twenty barely noticeable, but more risky microblink jumps to run a second survey sweep. At the end, with only Fleet crew at the control positions, the ship would make a couple of risky, combat-standard blinks towards home.

Those last jumps would be hard on the fresh Dzhou crew, but they'd have to learn to get used to it. Nobody ever died from blink syndrome, although many found themselves wishing otherwise for a few hours afterwards.

For the umpteenth time he wondered if this was what he spent all those years preparing for: to support the Dzhou colonists' pretensions of glory? Was it worth it to have to suck up to rich popinjays like "Captain" Win Ha, who had gotten command of the ship through political connections and influence? It certainly wasn't his military knowledge or command ability; he'd amply demonstrated his failures in both areas.

Simon gritted his teeth. Sadly, the answers were yes and yes. The Fleet simply couldn't afford to keep *Pride*—or any of Fleet's other warships—in service unless the colony clients supported them. The end of the war had turned the Fleet into a bunch of damned mercenaries, begging for scraps from the colonies they once defeated or defended.

It hadn't been like this during the dust-up, when the Fleet was the only force capable of keeping the colonies' pitiful collection of warships from ripping into one another. Back then the Fleet had brought the civil war to a close, subdued the ambitious, and protected the uninvolved. Back then, nobody objected to the cost. Back then the Fleet was respected, honored, treated with the deference men and women willing to die had earned.

It was a shame that a good ship like *Pride* had fallen on such hard times. There should have been a better end to her, perhaps an honorable death in combat. She was a good ship; responsive to the helm, agile in motion, and strong enough to take multiple blinks without harming her structural integrity.

He'd joined the Fleet close to the end of the war, seen a battle or two—which was no more than sitting around imagining a distant blip turning into a cloud of debris while hoping they had not predicted your own track with equal accuracy. No dogfights, no close seventeenth-century-style encounters. No hand-to-hand combat. It was all long-range death and destruction. In the few years he'd fought he'd never seen the faces of those he killed. Never touched the bodies.

"Sir!" the Rating at the scanner exclaimed. He was a good kid, somewhat excitable, but disciplined enough on watch to overcome that characteristic. "I have a target."

"Confirm," Simon snapped back. There shouldn't be anything out here, so far away from the path of incoming ships. Had to be an anomalous piece of junk or some drifting war relic.

"Moving at 1000 kps, sir," scan reported. "Bearing true on our track."

That was strange. The odds against two objects intersecting in deep space had to be astronomical.

"I've got confirmation," visual chimed in. Simon switched to that display and saw a point of light. The time between its first appearance on the deep scans and visual sighting had been a matter of minutes.

If it was a hunk of rock he'd better get the ship out of its way, Simon realized. Well, no time to spin the drives up to microblink out of the way. "Rotate ship thirty degrees and pulse docking engines one quarter." The warning klaxon sounded to alert everyone that the ship was maneuvering.

The stars slowly rotated as the gyros and steering jets turned the great ship. "Target closing fast," scan and visual reported simultaneously.

We're moving too damn slow, Simon thought. The dancing spot of light on visual had resolved into a bright, jagged object. "Fire engines half." Even though *Pride* had rotated only fifteen degrees, that burst should push them out of the thing's path.

"Object turning to match," scan yelled. "It's under power!"

Crap, that meant it wasn't just a piece of ancient wreckage. "Vector?"

"Should intersect in 200 seconds, sir."

Simon thumbed his headset to the command channel. "Captain Win Ha to the bridge. Possible hostile incoming."

He turned his attention back to the object. "Signals?"

"No SIFF, sir. No response to ping." comm watch reported instantly. Damn, that meant hostile for sure. Every ship was supposed to carry the identification-friend-or-foe beacon. "What's on visual?"

"Looks like a, well, an iceberg, sir." The Rating was obviously having trouble believing it herself.

"An *iceberg*?" Simon had to admit it did look that way as the enlarged display flashed onto his screen.

Win Ha's voice cut into his thoughts. "What the devil is going on up there, Simon? Is this another of your damned Fleet exercises?"

The need for continual and repeated drills had been a bone of contention between them since Win Ha came on board. He simply didn't seem to grasp the need for constant training that could spell the difference between life and death in an engagement. He was glad that Win Ha had remembered to use his headset. *Pride*'s Captain had not been too conscientious about such things in the past.

"Captain. I believe the object is . . ." He hesitated, not quite believing what he was about to say himself. "It's an iceberg"

"An iceberg? Damn, this *is* another one of your stupid drills, then. All right, don't do anything until I get there." There was no mistaking the disbelief in the Captain's voice.

"Object still maintaining bearing on us, sir—intersect in eighty seconds, sir."

Where the hell was Win Ha? He should have been on the bridge by now. Suddenly Simon felt the full weight of responsibility. It was up to him to respond, to act.

"Arm weapons," he ordered and prayed the colonist crew had been maintaining the equipment properly. "All track the object."

No sooner was the order given than gunnery sounded the alarm, alerting everyone on shipboard to go to battle stations. Simon felt the pressure change as, throughout the ship, blast doors were slamming across the corridors, sealing the ship's compartments into independent, survivable units.

"Damn it, Simon, what the hell are you doing up there? Why are we going to battle status?" Win Ha shouted. "Wait for me to get there." Where the devil was he? He should have been in his rack, a few steps away.

"Signal on all frequencies. Flash the work lights on the hull," he ordered, recalling safety protocols drilled into him in military school and reinforced in the war.

"Still closing, rate decreasing, sir," scanner reported. "Turning parallel to our track, five clicks ahead."

Simon watched the object take its position. It was close enough to see every detail. And what he saw wasn't believable.

In all the years of exploration mankind had found no sign of intelligent life—no lost civilizations, no emerging intelligence, no evidence that offered humanity companionship against the long night.

Until now.

Up close the object looked like a chunk of ice—jagged in all directions. Try as he might, Simon could find no symmetry, no order to the structure. Instead it looked like a broken shard.

There was no indication of what propelled it—no observable drive tubes, no sail, nothing recognizable. There was a glow to the object, as if it were lit from within. The fore peaks glowed a barely noticeable pale red while those aft were tinted a faint blue.

Were those weapons and engines respectively, he wondered? "Are we recording?"

"Aye, sir, since we acquired the target," visuals reported.

"Captain Win Ha, where are you now?"

"Aft 15, Bee, down five, bulkhead, uh, 15B20," Win Ha replied. There was the grating sound of a hatchway slamming shut behind him. 15B20 was clear at the other end of the ship, near the boat docks, Simon realized. What had Win Ha been doing back there?

"I believe we have an alien vessel, sir," he said, not quite believing it himself. He tried to recall the first contact protocols and drew a blank.

"Commander!" Simultaneous shouts from visual and weapons drove all else from his mind. He glanced at the visuals and went cold. The alien ship was turning while maintaining its position. The rosy peaks were now glowing a bright red.

They're powering up their weapons, Simon thought. "Fire a warning," he ordered and felt the ship shudder as the big repulsor fired. "Engines full!" They had to get away from it.

An instant later a starburst appeared near the trailing edge of the alien ship.

"What was that? Did you fire a weapon?" Win Ha screamed. "I told you not to . . ." Whatever he was going to say next was lost as the alien suddenly accelerated.

Simon didn't wait for confirmation from scan or visuals. "Fire at will," he shouted. "Fire at will!"

But the command was already too late. The alien had accelerated so quickly that the heavy weapons couldn't be brought to bear. Simon felt the impact shake the ship as the alien struck and, an instant later, watched the command board go to red as reports flooded the comm lines. Alarms started ringing. "Fire aft," came a report. "Hull breached at Aft 13, topside," another chimed in.

"Damage control on line." That command silenced the cries. From this point on the information pouring in from a dozen different stations near the impact zone would be handled by DC. Simon glanced at the visuals. The port viewer showed junk and—was that a body?—streaming from the side.

"Any other targets?" he asked, wondering if she could withstand another encounter.

"None detected," Scanner replied. The quaver in his voice indicated that he wasn't completely confident in the reliability of his equipment. Not after seeing the alien's closing rate.

He thumbed Boats. "Chief, dispatch boats to retrieve anybody who went spaceside. That's first priority. Then survey the damage and collect whatever you can find. There has to be something left of that thing we can salvage. Maybe even a survivor. Collect everything you can find."

"Aye, sir," the Chief replied.

Simon didn't have to issue orders for damage control. Thanks to the drills, everybody on *Pride* knew what had to be done. He'd trained them well.

Gunnery spoke. "Sir, shall we maintain fire control, sir?" Simon nodded and a moment later sent a second order. "Third watch to the bridge."

Win Ha burst onto the bridge, all indignation and bluster and, close on his heels, Commander Theresa Perry. "I'll have your ass for firing weapons without my authorization, Commander. I told you . . ."

Simon was distracted momentarily. Why was Teri with him? She was supposed to be in her rack, getting her rest, not running around with the Dzhou Captain, screwing something else up.

As the third watch tumbled sleepily onto the bridge, Simon greeted Hank Sterns, his cabin mate. Lieutenant Sterns was a few years his junior and had no war experience. "Hank, we need to begin recovery operations."

"Let the crew handle that," Win Ha interrupted. "I want to know what happened. Why didn't you wait for me? I *am* the Captain of this ship!"

Hank saluted and removed Simon's key. "Sir, I relieve you." He then keyed himself into the log.

Win Ha spoke again. "Damn right you are relieved. Teri, er, Commander Perry will take over damage control."

"Sorry, sir, but Perry doesn't know *Pride* as I do. Besides, she'll need to help Sterns." Then Simon was off the bridge and racing down the corridor toward the impact zone.

"You are confined to quarters," Win Ha shouted. "You can't disobey me like this!"

The center passageway lights on C deck flickered as Simon passed through the first set of hatches. "You'll have to go back, sir," a Rating, First Class said as he struggled to get his mask on. "We've got a fire in this section." Simon could smell the ozone. Electrical, he thought as he retreated. He reported the event to damage control as he tried to find another route.

The outer passageway appeared to be clear of damage. It was a swarming mass of men trying to get to the damaged sections with their gear. Three Ratings and a swearing Chief-Third were struggling to free a hatch that had somehow jumped out of its track. The muscles on the men's shoulders and arms stood out from the strain but the hatch would not budge.

Just at that moment a crewman in cook's garb ran up with a huge metal pipe and inserted it into the bottom of the hatch. Everyone grabbed the edge of the hatch as the cook pried it straight. Finally, with a scream of tortured metal, the hatch came free.

The Chief was the first through. "Get a med kit," he yelled over his shoulder. Simon saw a wounded man lying on the deck. In seconds medics pushed by and started treating him. Simon stepped back to let a well-disciplined salvage trio rush by with their breathing gear and cutting torches. He followed, continuing to report everything he saw in a steady monotone back to DC.

The damage looked worse the closer he got to where he thought the object had hit. The deck at this point looked as if it had been pushed up at an odd angle and several of the hatches were swinging free of their restraints. The deck was littered with an assortment of clothing and other loose items.

Damage control reported that compartment fourteen was the primary damage area. From all they could tell it had lost pressure within seconds of the impact. Simon checked the bulkhead—12C42—which meant that the damage extended across two compartments and deep into the center passageway.

Simon swore. To have damage this far from the impact meant the object had hit hard enough to warp the entire structure.

How many men had died in the impacted section he couldn't determine. As he recalled, the section contained sleeping quarters, storage holds, and some command and control modules. He'd find out which later.

"What about twelve?" he demanded.

"Lost pressure, sir," came the reply. Simon increased his pace.

He was gratified to see that there was no panic among the crew, even among the Dzhou crew. Well, maybe some of them were veterans, he thought. But although all of them appeared to be dazed, they continued to perform their drills, just as they were trained.

"Get your damned jujube asses over here and help get these panels out of the way," a Chief in a filthy, torn one-piece, but with a Chief's hat firmly on his head, ordered. Simon winced. Win Ha was hell on anyone who used that term.

"How goes it, Chief Forbes?" Simon asked, reading the nametag through the grime.

"We need medical help for the injured, some cutting tools, and at least one fire suppression Rating, sir. Aside from that, stay out of my way so I can get my men out of there." He pointed to the bulkhead of section twelve.

Simon stepped back. He'd been around long enough to know when to accept orders from a Chief. This was no time for military formality. He repeated the Chief's request to damage control. "Help's on its way," he said when he received confirmation.

At the far end of the section a Rating with a torch was enlarging a hole beside the hatchway. A group of men with a pressure tank and emergency equipment were patiently standing by. As soon as the glowing panels hit the deck his helpers tossed them out of the way into a nearby sleeping compartment.

"Need to enlarge this so we can get the pressure gear through, sir. There's a slow leak and we've got to get around the jammed blast door," one of them informed him as he waited for the next panel to fall.

This had to be the leaking section. He quickly ran through the assignment list and realized that twelve was the section assigned to the Fleet marines. Assuming they were all in bed at the time, there might be twenty marines trapped in there. "Estimated time?" he asked.

"Don't know, sir. All I was told was to cut a big enough hole here." The Rate with the torch wiped his brow as his helpers moved another red-hot section aside. "Probably another five minutes."

Simon dropped down one deck and continued to work his way aft. All about him the crew were purposefully going about the business of recovery—trying either to rescue their shipmates, or to repair the damage done by the impact.

He recognized Signet Bam Sutra, the young Dzhou engineering officer, directing a work party. They were sealing a temporary emergency lock to a bulkhead. Inside the lock another crewman in full vacuum gear was cutting the outline of a man-sized hole.

"Glad to see you, sir," Bam said. "What the hell happened? Are we under attack?" Simon could see the panic lurking behind the young officer's eyes.

"Not any more, Signet. We're safe now. What's going on here?"

Bam checked his wrist pad. "Whatever we hit must have warped the hell out of the structure. Both the blast door and emergency hatches are jammed. I'm cutting through here so we can get around the blocked section."

"How soon do you think you can get to our marines?"

Bam looked startled. "Marines? Damn, don't tell me they were all in quarters. Never mind, let me speed things up a bit."

Bam shouted for his work crew to line up at the emergency lock as the torch wielder continued cutting away at the bulkhead. Simon noticed that only half of the waiting crew had their helmets sealed. Things could get very nasty when they broke through.

There was a loud explosion and then a horrible whistling noise that steadily grew louder. "Breach!" someone shouted. Instantly every one of Bam's crew sealed their helmets. The entire cut section had given way. Of the torchbearer there was no sign. The inner door of the lock had slammed shut immediately.

"Let's go! Let's go!" The Chief pushed his men into the lock, slammed the hatch, and dogged it shut. In seconds all of his crew had opened the inner door and disappeared into the hole. The whistling continued until Bam sprayed the edges of the lock with some more sealant.

"No pressure inside. Poor bastards," Bam muttered. Whether he meant his crew or the lost marines, Simon wasn't sure.

"Damage control is ordering pressure barriers," Simon told him. "Should be here soon."

"Ask them to get a hull crew out as well," Bam said as he pulled on his own vacuum suit. "Right now I have to get in there and see what needs fixing." Then he turned and, with the Chief and another work crew, climbed through the lock.

Simon wondered if the young Signet would be able to bear up after seeing what combat damage and rapid decompression did to the bodies that were certain to be inside. Simon was pretty certain that none of those in the section would have survived the initial impact. Marines were tough, but not tough enough for this.

All Boatsman Han Tomis wanted to do was to put his hands on the controls of *Hotsy*, his boat. He loved hearing the disconnect bolts releasing his craft from its berth at *Pride's* side and feeling her fly free.

Flying was the most wonderful thing he had ever done in his life. Out there among the stars he was one with the boat. His arms and legs were the tiny exhausts that moved the boat, his eyes the sensors that gave him spherical vision. He was an angel, a bird, a being so free of the mundane universe that his body felt like some clumsy puppet in comparison. In flying he felt happiness, he was fulfilled. He felt joy.

But, instead of flying free, he and Boats crewman Ming Ho were hooking their boat's heavy panel covers into place, just as the Chief had ordered. Ho was fastening the bottoms to the clips while Han worked on the tops. Maneuvering the thick covers was hard work, especially since both of them had to wear the stupid safety gear. Han hated the awkward breathing gear that chafed his neck even more than the tight pressure suit that made movement awkward. But Boats Chief Willums was as tight on following regulations as he was on spit-shining the freaking decks of his precious boats.

It was so dumb to have to wear this safety gear when the boat was firmly secured in its berth. The access passageway was only three meters away, more than close enough to get out easily in case of an accident. He could clear the doorframe in two seconds—three maximum!

His arms felt like lead from moving the stupid padded covers in zero gee and his back was starting to tense up as well. Ming Ho seemed to be chugging right along, bless her little jujube heart. She seemed tireless, never complaining, never protesting, *accepting* every detail the Boats Chief handed out with equanimity. The perfect little crewman, wasn't she?

The boat vibrated, startling him from his thoughts. "Did you feel that?"

Ming Ho tilted her head to the side. "Ship's maneuvering." Now that she mentioned it, he had heard the alarm ringing in the passageway, but had paid it little attention. There was always something happening.

The boat shook from a sudden sharp pulse. Han knew what that meant. "They fired the big gun. What the hell—"

Before he could complete the sentence the boat jerked sideways by a fierce jolt that rattled every loose part of the boat.

"We hit something," Ming Ho announced as she hand walked along the net to the hatch. She did not seem alarmed at all.

Han, on the other hand, felt a bolt of pure panic. *Pride* was eight, maybe nine lights out from Dzhou. If anything happened to the ship there would be no way to get back. Oh, lord, why had he ever joined the Fleet?

"All boats, all boats." The Chief's shout over the comm brought him back from the edge of panic. "Launch all boats. Search and recover. Search and recover."

"Shit!" Han drove himself toward the controls. Ming Ho had the hatch sealed before he was firmly anchored into the pilot's console. With a flick of his wrist he blew the bolts that held *Hotsy* tight to the hull. A twist of the stick gave the side thrusters a quick squirt to clear the side of the ship.

He glanced along *Pride*'s side as *Hotsy* drifted away. The other two boats were still in place, meaning he'd gotten away first. "This is Six, Chief. We're away. What are we searching for?"

The Boats Chief answered immediately. "Get around to the dorsal side, Tomis. Keep the channel open and tell me what you see."

Han shrugged. "All right Chief. Well, things look pretty normal so far. I see Five starting to pull away. I'm passing over Four now and can see Three and . . ."

"What is it, Han?" The Chief yelled. "What's the matter?"

Han made a choking sound as he fought to stay calm. "It's a marine! A marine just floated by me, only he was all bloated and bloody and didn't have legs and . . . Oh sweet Jesus, here's another one! Chief, there's a lot of shit floating around out here."

"Ignore the bodies, Han. Tell me about *Pride*. Tell me what you see."

Han took a deep breath and tried to ignore the carnage around him. "Looks like there's a big dent, no, it's a fucking hole in the hull! There's all kinds of stuff coming from it, shiny and glittery in my lights. I can hear it hitting the hull, like sleet, only it couldn't be because you can't have ice in a vacuum can you, and—"

"Calm down, Tomis!" The Boat Chief's bark drove everything else from Han's mind. "Concentrate on doing your job."

Han realized he'd been babbling. "Right, just do your job of search and recover," he said to himself over and over.

"Put this on," Ming Ho was floating behind him with the outer shell of his pressure suit in her hand. Hers was already on. She needed only to seal her helmet before she'd be ready to work in a vacuum.

Han snapped the shell around him and clamped his helmet tight to the ring coupling. "Comm check," he said to make sure their intercom was working.

"Check," Ming replied and gave him thumbs up as she popped the blower to evacuate the boat. She clipped her safety line to the deck. When the pressure light went out she opened the wide cargo hatch in the boat's side and leaned out.

"Port side, dorsal, down twelve meters," she directed and Han shifted the ship sideways and down with a practiced flick of the controls.

"Got it. Ahead slow." He didn't know what Ming Ho was pulling into the cargo bay and didn't care. All he was doing now was following her terse commands and keeping an eye out for anything that might interest the Chief. He kept trying hard not to think of the bodies, but it didn't work.

The debris cloud seemed to taper off behind *Pride*, stretching as far as he could see, glittering in his lights. Whatever they'd hit was probably far behind by now.

Ming Ho continued calling out directions in a steady monotone. Han glanced back at one point and saw that the net in the hold was filling with torsos, legs and arms, some unidentifiable bloody pieces, and large chunks of the glittery stuff. He didn't take a second look, not even when he heard Ming Ho retching. He almost lost his own breakfast at that point.

"Umpf!" Ho's grunt took him by surprise. He glanced back to watch her wrestling a huge hunk through the hatch. It didn't look like anything from *Pride*. Looked more like a large piece of ice.

After that there were more bodies, more glittery trash, and trash from *Pride*. After a while the scene outside started to become depressingly familiar and he was able to distance himself from it, able to fly through the grisly galaxy of debris like an angel. As ever, there was only the boat and himself.

But he felt no joy.

"I've shut down the ship's propulsion systems," Hank Sterns reported as Simon was waiting for the engineering officer's report. "Captain Win Ha wants us to head back to Dzhou immediately."

Simon couldn't believe his ears. *Pride* was horribly, perhaps fatally crippled, they had boats scouring the area and men working outside on the hull. Nobody knew the full extent of the damage yet. "He's insane. We don't know if the pods were damaged, if the struts are out of alignment, if the hull will hold. Any attempt to move could destroy the ship and kill the crew!"

"I told him that, Simon. But he doesn't believe me. Says all of us Fleet officers hang together, as if this were some sort of plot to usurp his authority."

"That's par for the course. Tell him that I, as senior Fleet officer aboard, have declared that we are at war. You got that, Lieutenant? I hereby declare we are in a combat situation and in grave danger and that means *Pride* reverts to Fleet control."

"Effectively taking all of the Dzhou officers out of command," Hank replied. Simon didn't need to see him to know he was smiling in anticipation of telling Win Ha to piss off.

"Right. Log my order. I'll take the grief."

Bam Sutra kept one glove on the guide rope as he made his way through the damaged section. The vacuum gave the scene an unnatural clarity. Sparkling particles swirled in the light. In the distance he saw the faint glow from the crew who'd preceded him.

He reached the first pair of his crew. They were cutting away at a spot where the deck had been thrust up and backwards, toward the stern. The bulkhead had been crumpled against the top of the passageway. The jagged edges, where the base of the bulkhead had been torn loose from the deck plates, left a gap. He knelt and peered through.

At first he couldn't make sense of what his light revealed. All he could see was twisted metal, broken piping, and loose insulation. He thought for a moment, trying to form a three-dimensional image of this part of the ship and, as soon as he did, the mess began to make sense.

He was looking down two levels, through the remains of the first deck below him. Only there was too much structure for that area, so whatever they hit must have pushed the outer part of the ship into this section. "Widen this hole and rig me a line," he ordered. "I need to get in there."

Minutes later he was clambering through the gap, trying to make his way to the outer hull through the twisted metal wreckage. As he was worming his way through a crushed section his headlamp picked up a smear of bright red ice. It was subliming into a pink mist as he watched. Curious, he thought.

Another push forward revealed the source of the smear. It was the remains of someone crushed by a heavy beam. Parts of the man's entrails twisted grotesquely as they were bumped by the randomly moving debris. There was no head to the body, or arms, as far as he could tell. Perhaps they were at the other end of the smear.

Strangely he felt no emotional response to this sight. It was just another damaged part he had to get by to find out what had happened to his *Pride*.

Another four minutes and he could see stars. The hull, the nearly impenetrable armored hull of the Hellion Class ship, had a crack, a rip, a tear about twenty meters long and four across. On either side of the opening the hull had been deformed.

He estimated that the dent was about sixty meters long and thirty wide. The longest dimension ran from bow to stern and was deepest toward the stern. The impact must have hit a glancing blow to make that sort of scar. He'd hate to think of what would have happened had *Pride* hit it directly.

He thumbed his radio. "Damage control. This is Engineering. Contact my hull crew. Tell them to remove the dorsal cowling from one of the engines and bring it to the damaged part of section Twelve. Alert my welders to join them. We're going to have to put a patch on the hole and seal it tight."

As soon as he got an acknowledgement he keyed Forbes. "Chief. Get a crew down here with some sealant and something we can stretch across a hole—about two hundred square meters should do it. We've got to rig a patch inside so we can pressurize this volume. Hell of a mess down here."

"You all right, Signet? You sound kind of funny."

"Believe me, Chief, there's nothing funny about it." He was about to tell the Chief about the body, but thought better of it. No sense getting him upset.

Then he began surveying the rest of the damage.

A few hours later Bam stumbled from the emergency air lock.

"I know the situation," Simon said as Bam removed his helmet and gloves.

"But I want a personal assessment."

Had the Commander been sitting out here all that time, Bam wondered? No, he must have come down when he got word that he was coming back out. That was Clay, no wasted effort.

Bam wiped the sweat from his forehead. After five hours in the suit he was starting to worry that the three-shift punishment he'd assigned one of the Ratings a few hours earlier might have been too harsh.

"We've almost got the breach sealed, sir. Put a temporary inner seal over the hole. Covered it with a layer of quick-setting plastic and squirted sealant around the edges.

"My hull crew is welding a cover they rigged from an engine cowling onto the hull. That and the inside patch should let us restore pressure to the section. If it holds we'll know we haven't missed some other leaks. It's pretty messed up in there, but . . ."

"Anything else?"

Bam thought. "As I reported, there's lots of internal damage where the hull was pushed in. Mostly panels smashed against one another. A couple of structural members were torn loose and . . ."

Simon waited for the Signet to finish. "Go on."

"I . . ." Bam began. "There was . . . I saw . . ." Then he bent over and was violently ill, throwing up on Commander Clay's uniform. He started crying and couldn't stop. All he could think of was that sorry-assed guy who'd been smashed to a pulp, decapitated, and gutted by the ship that was supposed to protect him.

"What's your assessment of the worthiness of the ship, Signet?" Clay demanded, ignoring the Signet's obvious distress.

"I don't know about the pods, sir," Bam choked out as he wiped the puke from his chin. What the hell did Clay want him to say? They had to pressurize the section, get the bodies out of there, clean up the mess, and restore whatever vital systems might have been damaged. Just making a decent assessment was going to take hours, days maybe. He started to pull himself to his feet, slipping a little in a smear of vomit.

Simon looked at the Dzhou officer. He looked like hell, and probably felt worse, but he was the only man who could provide the answers Simon needed. "Get me what data you can in two hours, Signet. I want to know if *Pride* can get back home without killing us all."

Simon was reviewing the damage control logs when Bam returned from his survey of the pods and struts. "You'll be glad to know that we have four surviving marines," he said to the young officer. "Turns out they were playing cards in the mess when we got hit."

"That's good news, sir," Bam replied. He still couldn't get the image of the dead man out of his head.

Simon shrugged. "Not really. Altogether thirty members of *Pride*'s complement are dead and at least an equal number have been injured." He shrugged, trying not to think about that. Time enough later to grieve for them. "But that's not important. I need to know what you found out. Is *Pride* in any condition to return to base?"

"The integrity of the ship's hull is uncertain." Bam replied. "According to what Scans reported, we must have hit the object at better than a thousand kilometers per second." He still didn't believe that number. There was no way *Pride* could have been moving that fast. "At that speed even a pebble could make a dent in *Pride's* hull."

"That thing was substantially larger than a pebble."

Bam nodded. "Right. Based on the hull deformation and internal damage I figure that the object must have massed about five thousand tons. We're damned lucky it didn't take out one of the outriggers. Oh yes, there seems to be a lot of glass fragments floating around but we can't figure out where they were coming from."

"Pieces of the thing that attacked us, probably." Simon handed Bam a fist-sized piece. "It looked like an iceberg, but glass would give it the same appearance."

Bam turned the shard over in his hand. "An iceberg, sir?"

"Forget it. Just answer this—how much can we safely push *Pride*?"

Bam hesitated. "In my professional opinion, sir, *Pride* shouldn't risk more than a microblink because of the damaged struts and the misaligned pods. The alignment is so bad we'll have to make navigational fixes to be certain of where we emerge.

"Then there's the hull. I wouldn't trust the patch to take any more stress than it has to. Even then I'd keep my fingers crossed and make sure nobody was in that section."

Simon swore. They were forty microblink jumps away from Dzhou. That many successive jumps meant even the most hardened crewman was going to get sick. By the time they got back to Dzhou he'd be lucky to have half the crew well enough to sit position. Forty jumps! The ship was going to reek of vomit and shit.

"I'll want to inspect the repairs and the struts after each jump, sir," Bam continued. "Best we keep the probability of failures as low as possible." He didn't look like he relished the job.

"Very well. That's what we'll do. But we'll keep all the compartments sealed. *Pride* will remain on battle footing until we reach home."

Win Ha did not look well when they entered Dzhou space and squawked for the tugs to take them in. "I am having you arrested," he declared. His sallow skin tone spoke volumes of the toll repeated microblinks had taken on him. Win Ha had screamed for the bridge crew to speed their progress until sickness silenced him. "You have continued to thwart my command, delayed getting the injured crew back to proper medical care, and suborned my officers."

Win Ha stepped aside as four burly crewmen surrounded Simon. "By your leave, sir," one of them said as he slapped restraints on Simon's wrists. "Please come with us."

Simon followed. The bridge crew stood as they passed through. Hank Sterns saluted. Win Ha scowled.

There was a clank as the pilot's boat attached itself to the *Pride*. A moment later the hatch opened and the Pilot stepped inside.

At that moment the four surviving Fleet marines stepped onto the bridge. All wore full armor and were armed. "We will escort our officer, if you please," the squad's sergeant said quietly.

Win Ha jerked. "You will not! This man is a prisoner on a Dzhou ship. He is under my command and will be tried in a military court for his insubordination."

The sergeant listened intently. "I understand, sir, but my orders are to bring him home and that's what we're going to do."

"This is outrageous. This is a violation of Dzhou sovereignty. I order you to get out of our way."

Four weapons clicked to readiness. The bridge was completely silent. "I understand, sir. You'll probably want to charge me for insubordination as well, but I'm escorting Commander Clay back to our base regardless."

Win Ha turned to his men. "Well, are you going to let them do this?"

The nearest crewman stepped forward and tapped a marine on the chest with his finger. The marine batted the hand away.

"Well, looks like they beat us into submission, sir," the crewman grinned. "Guess they'll have to take Commander Clay after all."

Simon watched the fascinating interplay of color as Win Ha's face went from sallow green of nausea to the beet red of fury. He never knew the human face had such a broad spectral range.

The debriefing by Fleet intelligence

was aggressive, thorough, and exhaustive. They had probed Simon's every thought, his every reaction during the sequence of events culminating in the impact with the object.

Simon was certain that everyone on the bridge, from the Chief down to the ratings, was undergoing the same thorough interrogation. He hoped that none of them took offense. It would reflect badly on him were they less than professional about this dreadful incident.

The question Intel asked most often, and one that constantly preyed on his mind was this: Was the alien's reaction due to fright at that warning burst or had its attack been a deliberate act of aggression?

No one seemed willing to suggest an answer.

There were piles of glass scattered around the lab when they escorted Simon into the room. From what he could see they appeared to have been sorted by size—two piles of smaller pieces on a tarp to the right, two piles of pebble-sized pieces next to them, and two piles of fist-sized pieces beyond that. On the left were three larger pieces, one the size of a man's body, another somewhat longer and more slender, and a monstrous piece that looked far too large for Ming and Han to have pulled through their boat's hatch.

"These appear to be nothing more than glass fragments," the Chief investigator explained. "Considerably more dense than any glass we could make. It's nearly pure, which argues against natural formation, and trace elements in some of the smaller pieces appear to be homogeneously distributed." He paused and wiped his glasses.

"We found that there are two types of material, which is why there are two piles of each size. One is about four times the density of the other. Curious, wouldn't you say?"

He didn't wait for Simon to answer. "From what we can tell from the interviews"—he glared at Simon as if blaming him for having the object strike the area where the data was stored—"the object was moving quite rapidly and struck the ship at an oblique angle." He demonstrated with his two hands. From that Simon deduced that the man had been a combat pilot at one point—probably before he lost his legs.

"If it hit at that angle there would have been tremendous sheer forces at play. The leading lower portion would have been destroyed on contact with *Pride*'s hull, which probably absorbed the greatest force and penetrated the hull. That's where the grit and dust came from, we suspect. As the object continued along it would have been ground up along the surface of contact—that's what produced the larger pieces—until most of the impact energy was absorbed."

That tied with the damage Simon had seen. The deformation of the hull decreased toward *Pride*'s stern. But where was this leading?

"We estimate that the total time of contact was fifty microseconds—maybe less. From what we model of the encounter, that would be insufficient time to completely destroy an object of that size and mass without completely destroying *Pride* as well. That means the object must have fractured. The larger pieces here," he waved a hand toward the three chunks. "are probably parts of the object that were furthest from the impact zone—the top of the object, if you will."

Simon nodded. "Which means we've got a ship out there to find the rest, the parts that might still be intact?"

"Yes. But so far we've found nothing. By the time you got *Pride* home the pieces would have been scattered across an enormous volume of space. Even if we somehow managed to luck into your precise location we still wouldn't be able to find anything smaller than a ship's boat unless we get very, very lucky. Which makes these the only samples we have to work with."

Simon picked up a small flat shard and ran his finger along one face. It felt greasy, cold, and slick. The weight was not what he expected—as light as the construction plastic they used on board the ship.

"How could something this light do all that damage?" he wondered aloud.

"Light? Let me see that."

While the examiner felt the shard, Simon picked up another. This one had more heft to it. "This is different."

"We've found there are two kinds of glass. The heavier stuff is really dense and forms most of the smaller grits and dust. Since that formed along the impact zone we suspect it was the outer coating of the object. The lighter pieces probably represent the interior of the object. This piece, however"—he continued to rub the shard Simon had handed him—"seems to be a third type. Hmmm, we'll have to examine this one closer."

The rest of the meeting was perfunctory and a repetition of his intelligence briefing. Although they appeared attentive, Simon had the definite impression that they were more anxious to check the new type of glass than they were to hear his personal account of the encounter.

"You can go now, Simon," Commander Nolan, the Intelligence head announced. "You've said nothing new recently so I think we've hit the limit on what we might learn from you."

"You had everything a week ago, including the records."

Nolan shrugged. "Yeah. Pity most of the records were destroyed by the impact. What's left is in such poor shape that it doesn't tell us anything that's going to help the next guy who runs into these things."

Simon came alert. "You said 'these things.' Were there others and why the hell weren't we briefed?"

"I can't say, Commander. But it stands to reason—where there's one there's bound to be more, don't you think?"

So much for any hopes of getting a straight answer from Intelligence. "Can I get out of here and back to my quarters now?"

Nolan stood. "You'll be under guard until the trial, Commander. Seems the Dzhou Navy has brought charges against you."

That was a shock. "Charges? You can't be serious."

"Disregard of a direct order, unauthorized discharge of a weapons system, and reckless endangerment. I think they threw out the moppery and foppery charges." Nolan grinned to show how seriously he considered the Dzhou allegations. "Don't worry, Admiral Taylor's a good man. He takes care of his own."

Simon sincerely hoped so.

The funerals were depressing, long, and continual. Simon attended every one. As best he could he attended the Dzhou rites, but under an armed escort to keep the Dzhou military from getting their hands on him.

"We commit these souls to the ground. Ashes to ashes, dust to dust . . ." Simon knew the words by heart and was able to time the first notes of Taps to the microsecond. Even though he knew the ceremony by heart he still felt the tears roll down his cheeks when that first note sounded, no matter how much he tried to hold back. These men, these women, these *people* were members of his crew, people he'd sworn to guide and protect.

Was he responsible for their deaths? The thought that he might somehow have averted the disaster haunted him. Night after night he went over the entire scenario, from the first sighting to the impact, wondering what he might have done differently.

And with each funeral he wished he could have saved them.

Premier Tu'un stared at the other two men in the room. On one side of the table sat Senator Ma and Admiral Peng, head of the Dzhou Navy. Facing them was Senator Mn Ah of the conservative faction and Ma's fiercest opponent, and General Sur, Chief of intelligence. At the far end of the table sat Schwen Wei, the Premier's most trusted advisor.

"I find the entire incident outrageous," Ma said in a low, even voice. "This damaged ship is an insult to our military force, our government, and our people. For too long we have suffered the Fleet's disrespect."

"I understand your anger, Ma, but I fail to see what this has to do with the alien vessel," Senator Mn Ah said.

"Alleged alien vessel, Senator," Admiral Peng corrected. "All we have is the Fleet's report."

General Sur leaned forward. "I understand none of the Dzhou crew were on the bridge during this encounter. Why is that?"

Admiral Peng looked down at the tabletop. "I understand that Captain Win Ha did not think it fitting that the Dzhou crew should have to stand second watch on a training mission." He paused. "He now questions that decision."

Mn Ha smiled. He well knew the sort of discipline Peng brought to bear when someone caused him embarrassment.

General Sur cleared his throat. "There is the small matter of extensive damage to the ship, several lost lives, and the remains of the attacking vessel. I believe that could be considered evidence."

Ma dismissed the words with a shrug. "A few shards of what *might* be a glassy piece of rock that *might* have been floating around for a million years.

"Based on the scrap of video we have it's more likely that this hotheaded Fleet Commander ran the ship into it, then concocted this story about aliens."

"So you deny the visual record?" General Sur asked.

"Given to us by Fleet Intelligence," Ma replied. "It is possible that they doctored the visual and voice records from the interrogations before giving them to us. You do know our attempts to question the crew directly have been rebuffed?"

Premier Tu'un raised an eyebrow. "An interesting theory, Senator Ma, but tell me this: What possible motivation would Fleet have to inflict such damage on one of their own ships? Especially since they can barely afford to maintain them without our support?"

Ma pushed a sheet of paper down the table. "This is an extract of our contract with the Fleet. Give particular attention to the line I have marked."

"Article 34, paragraph B.3.4.23. Ah, yes, I remember it well."

Admiral Peng snorted. "This is no time for jokes, Tu'un."

"'. . . and exigencies that may override this agreement.'"

"Exactly." Ma said with a wicked grin. "I believe Fleet has concocted this story of alien invasion to get out of their obligation to continue to train our forces in space maneuvers. I believe this is an attempt to try to break the contract. It is no secret that there have been serious disagreements between Fleet officers and ours."

Peng nodded vigorously. "Serious disagreement is an understatement and it extends beyond the line. Admiral Taylor refuses to accept his subordinate role to me. In fact, he acts as if he is holds the real power."

"Are you suggesting that Taylor's people intend to use this incident to exert military power over us?" Mn Ah said. "Or to depart the system entirely?"

"Which would leave our forces without a space navy," the Admiral said. "Leaving us defenseless, not only against other colonies, but against the Fleet itself."

"A military coup," Ma added. "It is possible."

"Ridiculous," Senator Mn Ah shouted. "Taylor has no such notions. He is an honorable man."

Ma sneered. "Of course you would say that. It isn't your army that's suffering under his boot." General Sur stiffened, but said nothing.

The Premier considered the sheet before laying it down. "I shall take this matter under consideration. Thank you for bringing this to my attention, Senator. I imagine this will be the subject of floor debate when the council convenes."

Ma smiled, Mn Ha glared, and the two military men kept their expressions guardedly neutral.

The Premier sighed. He did not need another floor argument that would continue the rift within the council. There were more important issues to be discussed—disaster relief for the equatorial region devastated by floods, maintenance of Olympia, the decomposing orbital laboratory, and amendments to the Rights of Man document that had founded this colony.

But he could not take sides. As Premier he had to maintain a balance between opposing points of view, had to remain neutral in case he had to cast the final, deciding vote. If he did not carefully guard that neutrality, Ma or Ah would replace him in a heartbeat.

After both parties had left the room the Premier looked at his advisor. "Well, Schwen Wei, do you seriously believe this alien is some sort of ruse?"

Schwen Wei leaned back in his chair. "Was there an alien artifact? Probably. Did it attack the ship or did the ship accelerate to smash into it? I favor the former and doubt the latter. As to whether Fleet doctored the evidence to protect themselves—most certainly." He paused. "On the matter of breaking the contract I would state that highly unlikely."

The Premier chuckled. "That's what I like about you—always giving me a straight answer. But I agree with your assessments. The question now is what we shall do about it."

Schwen Wei answered immediately. "I have sources within the Fleet who can find out the truth of the matter, but that will take time. It is my estimation that Ma and Peng want to use this incident to discredit the Fleet and gain support for their faction.

"In the short term I think Peng will insist on making an example of the Fleet officer who created the problem. He did, after all, disobey a direct order from Captain Win Ha—"

"Who we both know is Ma's selection and a pompous ass."

"And it is Ma who controls the funds for the Fleet," Schwen Wei added thoughtfully. "One cannot easily argue against the purse. Peng believes that the Fleet will go to any lengths to protect its personnel and, by doing so, make themselves more vulnerable to offering concessions.

"Therefore we must do something to appease the Admiral's honor, but without destroying the balance of power between Ma and Mn Ah."

The Premier chuckled. "Always the strategist, aren't you? Well, I'll never play games with you, that's for certain."

"So I should activate my contacts in the Fleet?" Schwen Wei asked.

"I cannot tell you to do that," Tu'un said. "But neither can I stop you. I am, after all, completely neutral in military matters."

Admiral Taylor couldn't believe his ears. Instead of bringing all of their resources to bear on protecting themselves, the Dzhou Navy insisted on persecuting Commander Clay for doing his duty. Crap, they should be awarding him a medal instead!

"We insist that Commander Clay be given over to us so that we may try him," the immaculately uniformed Dzhou Lawyer-Captain insisted when he delivered Captain Win Ha's charges. He was a small man, barely chest high to Taylor. He had a thick shock of blonde hair that must have taken hours to set into those complex waves and curls, Taylor thought as he brushed his own close-cropped head.

"I will accept the charges," Taylor said slowly as he glanced at the official document. "But I'm afraid that the Commander must be tried under the Fleet Code of Military Justice. He is a Fleet officer."

"And he was on a Dzhou warship," the lawyer shot back, making his curls jiggle. "Under the command of an authorized Dzhou Captain. That means that he falls under Dzhou laws, Dzhou codes, and the Dzhou justice system."

Taylor had no doubts about the sort of "trial" the young Commander would face were the Dzhou to get their hands on him. "I shouldn't need to remind you that all Fleet personnel are under my command. They support Dzhou officers only at my discretion."

"That is intolerable, sir! My Admiral insists that you follow the terms of the Fleet contract. The honor of the Dzhou forces demands satisfaction."

Taylor grimaced. That damned "honor" of theirs was a constant pain in the ass. How could he take such a statement seriously from someone who wore his hair like that?

"I repeat; Dzhou law has no jurisdiction over a Fleet vessel in free space, Captain. None whatsoever. Now, if you will excuse me, I have work to do."

The lawyer wasn't out of the office for an hour when Admiral Peng called, ostensibly to talk about the schedule for the near-space exercises that were to take place the following week. "I understand you are having a problem getting supplies for your ships," he said after the schedule was settled.

Taylor tried not to let his anger show in his voice. "You damn well know the problems we're having getting funds, Peng. That's hardly a secret." Then Taylor realized what the call was really about. Peng wanted him to turn over Commander Clay. If he did that, then the funding might suddenly be released, or at least a part of it.

But that made no sense. Why would Peng endanger his own men, fail to prepare for the possible alien attack, just to prosecute a lowly Commander? There must be some other issue at stake, something having to do with the complexities of Dzhou politics, but he had no idea of what that might be. Nor did he care.

Just the same he was not about to turn on his own officer. He was not going to sell his own honor, regardless of the price. "I am certain that the funding will be forthcoming eventually. But Commander Clay will be tried in a Fleet court, following the Fleet Code of Justice. I will have it no other way."

"I demand that the Dzhou Navy be represented on the Board, Admiral."

Taylor thought hard. There was probably a clause in that contract that required their presence. He'd have to check on that. "I'll take that up with my Advocate, but I see no reason why we can't accommodate you."

"You will assure me that justice will be done," Peng said. "It is a matter of honor."

"Justice will be done," Taylor replied. "I promise you that."

"Excellent," Peng replied brightly. "I knew you were a man I could reason with."

Moments after closing the conversation Taylor sat back and reviewed the conversation. What had he missed that made Peng so happy?

Simon entered the room, took three steps forward and saluted the Board.

"Be seated, Commander," Admiral Taylor said. Simon noted the lines of stress etched on the old man's face. The Admiral must find this distasteful as well, he thought.

"Yes sir!" Clay snapped back and sat stiffly erect in the offered chair; hands folded in his lap and hat secured under his left arm. Best make a good show of this, he thought. Probably get a black mark in his record and an ass-chewing from the jujube Captain Win Ha, but he'd faced worse. Nobody could deny that he'd done everything right.

There were four senior Fleet officers and one noncom seated on the Board. Admiral Taylor, Captain Tassledorf, Commanders Byle and Sinte, and Fleet Chief

Gundarsten. Admiral Peng and General Sur were observers for the Dzhoubean military.

Simon looked at the Board. Their faces had become very familiar to him during the first phase of this mock trial. As before, the Fleet's members wore guardedly neutral expressions. The jujubes' were openly hostile. Terrible shame they'd be disappointed, he thought. The Fleet wasn't about to sacrifice him—everybody knew that. The amount of power and prestige on the Board showed that.

The Admiral folded his hands before him. "Commander Clay, do you understand the charges Captain Win Ha has brought against you?"

"Yes, sir. I do." For a second his mind flashed back to the previous week.

"Just keep your bearing, Commander," his counsel had said. "Answer simply and directly. Don't embellish, don't exaggerate, and for God's sake, wipe that smirk off your face!"

Clay tried. "Sorry, sir, but I just have a hard time taking this seriously. *Pride* was under attack. There were over a hundred men and the ship at risk. I did what I thought best."

Council nodded. "Good, but don't sound angry. The Board is interested in hearing the facts—the facts, not a pile of bullshit."

"Sir, you do believe what I reported, don't you?"

"Of course I do, Commander. I wouldn't be defending you otherwise."

"Now who's bullshitting, Commander? You were assigned this duty."

"True, but I do believe you, no matter how hard it is to believe. Well, it's time. Let's go." They marched into the hearing room.

The hearing went as he expected. Council had him tell the story and produced the transcripts of the debriefings to bolster what he'd said earlier. He also produced substantiating records of the rest of the bridge crew, all of whom reported the same sequence of events.

"Tell me, Commander," the prosecutor said softly. "Have you read the reports that accompanied the charges?"

"Yes sir." Clay tried to keep his face under control. Win Ha had made three charges—reckless endangerment of a Dzhou vessel in deep space, failure to obey a direct order, and discharge of weapons without proper authorization. Ridiculous, all of them.

The report had been brief. According to Win Ha, and substantiated by Commander Perry, they had felt the ship maneuvering, then accelerating. Shortly after, the weapons fired and the ship ran into something that damaged the hull.

"The conclusion that could be drawn from this testimony," the prosecutor said, "is that you thought you'd give your men a little target practice on a rock you detected, misjudged its distance and speed, and then fired to knock it off course."

"No, sir. It wasn't like that at all."

"According to your own testimony, you had several minutes between telling gunnery to arm weapons and actually firing them. Isn't that true?"

"Yes, sir. But there . . ."

"Did you request Lieutenant Sterns to authorize use of the weapons? It would have taken maybe ten, fifteen seconds I believe."

"I didn't think of that at the time, sir. Things were happening too fast."

"But you had time to consult with Captain Win Ha, didn't you? What did he say about arming the ship?"

"I didn't ask him, sir."

"What did he tell you to do, Commander?"

"To do nothing until he reached the bridge, sir. But that was before—"

The prosecutor didn't wait for him to complete his answer. "Immediately upon hearing this you went to battle status, shutting the blast doors, and sealing Captain Win Ha four compartments away from the bridge."

"That is not the way it was, sir." Simon insisted.

Things had gone downhill from there. Even the testimony from intelligence, which did not normally testify in court, was disappointing. The fragments of the alien they found were nothing more than shards of glass containing a smattering of trace chemicals. There had been no instrumentation, no organic materials, nothing that would indicate how it drove itself at such speeds, managed to maneuver, or exhibit color changes.

Sink Tao, one of the Dzhou scientists, reported on the four types of glass among the debris—the heavy material that probably coated the exterior, the softer, lighter interior material, a very dense thread of glass that ran through some of the pieces, and the greasy material Simon had accidentally discovered.

"It is very strange," Tao said of the greasy material. "It's composed of a layering of extremely thin sheets, somewhat like mica, but on a microscopic scale. That is what gives it this characteristic feel. With sufficient force—about two million dynes—you can actually deform the shard without shattering it. The dielectric properties are also quite interesting . . ."

"That's all very interesting," the prosecutor said, cutting the scientist off. "But does it shed any light on what happened? Does it tell us if the ship ran into the object or if the object drove itself into the ship as Commander Clay and his tame crew contend?"

"No. It does not. As far as we can tell the pieces are completely inert—merely different types of glass."

But, Simon's counsel contended, the technical testimony mattered little. It was Clay's interpretation of events in lawful command of the ship that mattered.

But that was last week. Now he had to hear what the Board considered appropriate punishment for protecting his ship from an alien attack and the orders of an incompetent captain.

* * *

"The Board has considered the charges and reviewed the facts presented in your defense. Are you prepared to hear our judgment, Commander?" Admiral Taylor scowled. It was obvious he thought the entire trial a charade.

Clay came to his feet and stood at attention. "I am, sir."

Admiral Taylor cleared his throat. "Under Article 110 of the Fleet Code: Reckless endangerment of a Dzhou vessel in deep space, we find that the evidence is not sufficient to prove that the events were as you reported or as the remainder of the ship perceived them to be." For this reason this charge is invalidated."

Simon felt relief. Article 110 was the most serious of the charges, the one that could cost him his commission and probably a lengthy spell in the brig. The rest of the charges were equally without merit and would be equally dismissed.

"The Board upholds the charge of discharge of weapons without proper authorization, under Article 92: Failure to obey order or regulation, to be substantiated by the record and by your own admissions," Taylor read. "By regulation, another officer should have validated that order. You did have sufficient time to contact other officers and failed to do so."

Simon felt sick to his stomach. It had to be the Dzhou who pushed that through. No Fleet officer would do that to him—but obviously at least one of them had. But perhaps he deserved that. There had been time to call Hank, He could have called.

Taylor watched Clay as he read the last charge. This was the most distasteful part. "Under Article 90: Willfully disobeying a superior officer, we find that the order to stay was valid. Captain Win Ha was the lawful command aboard the ship. Since you failed to explain the situation and obtain permission to act, your actions were precipitous and perhaps caused an alien vessel to be destroyed."

Simon felt as if he'd been punched in the gut. Of all the charges, this was the most ridiculous. Win Ha should have been readily available to the bridge during third watch, not back in stores doing whatever with Perry. If he'd been where he was supposed to be he could have been on the bridge in seconds. But then, that could have cost them all their lives. Win Ha never would have tried to move the ship, would never have believed the ship to be in danger until it was too late.

Taylor and the other Board members stood. "In accordance with the Fleet Code of Military Justice, and with a majority of the Board in agreement, you are reduced in rank to Under-Lieutenant, effective immediately."

"I protest!" Admiral Peng was on his feet, shaking his fist at Taylor. "Firing on a defenseless alien, destroying mankind's chance to communicate with our alien brothers, another starfaring race, is beyond serious: it is a grave offense! The man should be hung, not demoted!"

Clay didn't flinch at the outburst, his expression didn't change. "I hear and understand the Board's determination," he responded, fighting back the tears.

Taylor wondered about Peng's outburst. During the Board's deliberations Peng had appeared to be the biggest skeptic of the alien ship theory. What was he trying to do?

"May I remind the Admiral that he is here as an observer and remains only by my leave. This is a military court under the *Fleet* code. If anyone else makes an outburst I will have the Sergeant-at-Arms remove them. Is that clear?" He didn't bother to look around to see if they understood.

Now came the worst part, the part he had to concede to the Dzhou sense of honor. Don't crack, Clay, he thought. Be professional and show these damned Dzhou what a Fleet officer is made of.

Admiral Peng walked around the table and stopped in front of Simon. "You have no idea of how much pleasure this gives me," he whispered as he removed Clay's bars. "I still think you need to be hung." He dropped the bars to the deck and stepped on them as he returned to his seat. The crack as they shattered under his boot sounded like the springing of the hangman's trap.

"By regulation and with the authority invested in me by the FCMJ," Taylor continued, "You will be reassigned to the next available Fleet ship outbound. Until such a ship docks you shall be restricted to the base to perform such duties as assigned."

The two Dzhou hastily conferred. "This was not what we requested," Peng said. "I thought we agreed that he be remanded to our authority."

Admiral Taylor grinned. "That will not be possible, Admiral. The Fleet code is quite clear about immediate reassignment of a demoted officer. He cannot be released until such time as his ship arrives and comes under the command of its Captain. You, of course, can then negotiate with that party."

Peng stormed out of the hearing room. "You have not heard the last of this!"

Clay saluted. His arm felt as if it were made of lead. "If the Board has no further need for me, sir." He turned smartly on his heel and strode from the room. Only Chief Gundarsten had returned his salute, but the rest of the Fleet brass had smiles on their faces. Were those smiles at seeing him pilloried or because Taylor had put a stake up the jujubes' behinds, he wondered? Some of them had to have voted for his sentence.

"I didn't see it coming," his counsel said apologetically once they were out of the room. "You should have had a slap on the wrist at worst. I'll appeal, but it will probably take until after you've shipped out before we get another hearing."

Simon couldn't believe it. His whole world had just been shattered and this lawyer wanted to put him through it again? "Why bother?"

"Just to get it off your record," counsel advised. "Well, let me see what I can do. Sorry, Simon. I did my best." He hurried away, probably to another hearing.

The Admiral's aide, Kit Wilkerson, stepped forward. He held out a set of brown enamel disks. "Pin these on before you leave, Under-Lieutenant Clay. Admiral hates to see a Fleet officer undressed."

Still numb at the sudden change, Simon did as he was told and followed Kit to a waiting car.

As they headed for Simon's quarters, Kit relaxed. "I guess you know you got off easy, Simon. The Admiral had to apply every trick he could to keep the jujubes from getting their hands on you."

"But why? I couldn't risk the ship," Simon said. "It's unfair. I didn't do anything wrong!" He wondered how many times he'd have to say that before he fully believed it himself. The brown disks on his collar said otherwise.

"It was bad enough that I had to suffer that fool Sur's laughter afterwards. One would think he enjoyed seeing me shamed." Schwen Wei was weary of hearing Peng's endless repetition of how insulted he had been at Taylor's betrayal. "I thought Taylor understood our bargain. I thought the man had at least a shred of honor in him," Peng complained over his dinner.

"I doubt that Taylor understood the agreement as you did, Admiral. The Fleet protects its own, as you well know."

Peng shook his fist. "This is an outrage! We cannot allow him to escape justice. We must make an example of this hot-head."

Schwen Wei shook his head. "The Premier would not be pleased were you to take overt action, Admiral. The officer who so offends you has been demoted and soon will be removed from our presence. He has been shamed by his own command. That is sufficient punishment, I should think."

Peng swore. "Easy for you to say. You don't have to face my officers and men. They want blood. I have to make an example of this pipsqueak Fleet officer. I have to show my men that even a Fleet officer cannot dishonor our officers. I have to show my control over these Fleet mongrels."

"Give Win Ha another promotion to salve his hurt feelings. Make him an Admiral and give him a nice safe office on the surface. Perhaps logistics would be a good position."

"You don't understand my position. Ma's entire faction wants a protective Dzhou Navy presence, preferably without Fleet interference. We will never get that so long as the Fleet stands in our way."

More likely they want the Fleet gone so they can seize control of the trade lanes as they had during the civil war, Schwen Wei thought. "As I told you, Tu'un cannot condone any direct action against the Fleet. I would advise you against direct action."

"That is your final word, then?"

"It is mine, and the Premier's."

"But were this mongrel to disobey Taylor's orders . . ."

"The personal decision of a Fleet officer is not my concern," Schwen Wei said. "But actions by you are. I recommend caution."

"I understand." Admiral Peng smiled and bowed his head. It was gratifying to have the advice of the someone so close to Premier Tu'un."

Taylor would soon learn the price of betrayal.

Morning started, as usual, with the nightmare state of half sleep when Simon's mind took him through every agonizing minute of the trial and sentencing. The memory had sharp edges that cut deeply into his heart. He wouldn't touch his chest, fearing he'd feel the blood pouring out.

But there was never any wound, never any sign of physical damage. However, the emotional damage, the deep insult to his very concept of himself as a loyal and trusted Fleet officer, would not show.

After pulling himself from the pit of despair, Simon rose, worked out in the base gym, showered, ate breakfast at the mess, sitting apart from the other officers, and then reported to the Officer of the Day. As he had every other day since the trial.

"Got a nasty one for you today, Under-Lieutenant—inventory duty. The jujubes delivered sixteen rail cars of supplies last night and they have to be transferred to the warehouse."

Simon groaned. Inventory duty meant checking the invoices against the boxes that had arrived. Although he didn't have to handle the boxes himself he still had to ensure that every box, every item was accounted for. The Dzhou merchants had tried to short-list them before so this hands-on checking was necessary. Sixteen rail cars meant two days of boredom.

At least it was better duty than Officer-of-the-Day.

A week and forty rail cars later, even an Officer-of-the-Day assignment was starting to appeal to him. He had pulled every shit duty on the base at least twice and was likely to do them another couple of times.

The worst part of the demotion was having to salute the junior officers he'd been training months before. He took it as a sign of respect that they all smiled to show they knew how he must feel. But he doubted they really understood, not down at gut level where it hit him.

What would his father, his family think when they got word of his demotion? In two hundred years of military service he was the first officer in his family to be demoted. Others had been disciplined: His grandfather had been a rebel throughout his career, never rising above Commander. From the stories he'd heard, grandpa had faced more than one Board of Review and managed to scrape by every time. Unlike Simon.

When was a ship coming in to take him away?

"Nothing on the arrival log," Kit said as he joined Simon in the mess.

"Thanks, that saves me a trip," Simon replied. Twice a day he checked the inbound logs to see if they'd received a signal from an incoming Fleet ship and had been continually frustrated at the negative replies.

"Back during the war there would have been a dozen or more arrivals and departures listed every day," Kit said as the waiter brought their dinner. "Back then we had ships bound for distant systems or going out on patrol duty. Now we have to wait for months between ships."

Simon agreed. "Another damned sign of how far the Fleet has fallen."

Kit agreed. "Want to hear the latest?"

"About the alleged alien vessel?" Simon replied bitterly.

Kit smiled and tossed a sliver of glass onto the table. "Look at that. Be careful, though. I have to sneak it back to the lab before they notice it's missing."

Simon picked up the tiny shard and turned it over in his hands. There didn't seem to be anything unusual about it. There were two long grooves across one face. "Somebody try to take a sample?"

"Nope." Kit tapped the fragment with his finger. "Turn it around."

Simon twisted the fragment in his hands and examined the broken face of the piece. He spotted several holes, each a tiny, precise rectangle in cross section.

"The grooves are where those channels are exposed," Kit explained. "All of the channels or whatever the hell they are have less than a fraction of a percent difference in their dimensions."

Simon felt the object. "This is part of the interior material, then?"

"Quick on the uptake, aren't you? Maybe you should have gone into Intelligence instead of combat. You've got the brains for it."

"Brains aren't helping me now," Simon replied. "Damn it, Kit, I'm bored to the teeth." He handed the shard back.

"Buck up. At least you don't have to deal with that jerk-off Ha-ha any more."

Simon smiled. The Admiral's aide was one of the few officers who went out of his way to be friendly since the trial. Most of the others probably think the crap will rub off, Simon thought.

"Why are you here?" he asked. "I mean, don't you have to do something for the Admiral?"

Kit leaned close. "This is my *to-do*. Taylor told me to keep an eye on you. No telling what those jujubes will do now that their precious honor's been harmed."

"Do you think they'll try something on base?" Simon asked. The idea that he was worth kidnapping was ludicrous on the face of it. He was just a junior officer now, not some strategic power. Ridiculous!

"We have a lot of Dzhou on base—our waiter, for example. No telling which one will slip a blade into you." Kit looked dead serious for a moment and then grinned. "Naw, they don't want you dead—they just want you for a show trial."

Simon thought about the railcars. It had been just him and twenty Dzhou laborers. It would have been easy for them to smuggle him off the base in one of the empty rail cars. Suddenly Kit's warning didn't sound so ridiculous.

"Listen, you stay around people whenever you're out and about and you'll be all right, I'm sure."

"I'll keep that in mind."

Win Ha was furious when Peng reported on the outcome of the trial. "I can't believe that they let him get off so easily. I am the Captain. It was my order he disobeyed. It was my weapons he wasted. It was my ship he damaged!" His voice rose with each wounded accusation.

"You must do something about this," Win Ha said.

Peng brushed that aside. "The Premier will not support any overt action on my part. It is *you* who must avenge your own honor."

Win Ha wailed. "But what can I do? Clay is no longer in my crew. That is, my crew whenever you get *Pride of Dzhou* repaired."

"Our ship," Peng corrected. It was costing an enormous amount to have the damage repaired, even without the additional modifications. Did Win Ha think Ma was an endless source of funds?

There were limits to what the Dzhou Navy could afford. Repairing *Pride*'s damaged hull and the destruction inside was expensive enough. The cost of adding weapons pods, increasing the munitions load, and upgrading the power systems was outrageous and, in his opinion, wasteful. *Pride*'s weapon systems alone were superior to anything another colony could muster, so why did the Fleet think it needed this extra armament? They certainly didn't expect him to believe that story about an alien invasion, did they?

"You are a man of action, Win Ha," Peng continued, all too aware of the anguish of his officer. "You must act if you are to erase the dishonor you received."

"Fleet officers are supposed to follow our orders, not go off and do something on their own. What if we were attacked and they refused our orders to fight? What would we do then? Yes, I must do something that will show them who is in command."

Peng smiled. "I am glad you see the necessity. We need to stop this sort of insubordination. We need to make an example of this man."

Win Ha thought hard. "I could take him into custody, I suppose."

The Admiral sat back. "But he will be confined to base until a ship arrives. After that he will be beyond your reach. How will you overcome that?"

"I know someone who could manipulate Clay into our hands. Someone quite willing to betray him."

"You have a spy? How interesting."

"Shall we say a confidant, someone I trust and who has much to gain for doing what I ask. Yes, and if Clay disobeys orders and leaves the base he will be vulnerable. After all, who would defend him if he violates his own code of conduct?" He was about to expand on a plan, but stopped. "I'd best say no more."

"A smart decision," Peng replied. "What I do not know, I can't disclose. Let me know what support you will need when the time comes."

"I'll probably need some rapid transport," Win Ha answered immediately. "I'll need to get him as far away as I can." he thought for a moment. "Why not our orbiting station? That's under Dzhou control and law. Yes, and it completely removes Clay from sight."

"I am delighted that you've taken such firm control of the situation, Win Ha. Perhaps there might be a promotion for you if you are successful."

Win Ha brushed the compliment aside. "I will let you know the time and place to have the shuttle ready."

Simon was in the mess, contemplating whether he should have a second helping of pie. He had put on a few extra pounds since he'd been given base duty, despite his most strenuous efforts in the gym. He glanced up when someone sat down opposite him.

"Well, I didn't expect to see you here."

Commander Perry smiled at him. "I've been assigned planet-side until the repairs are complete, *Under-Lieutenant*." Suddenly her smile took on a different meaning.

"Don't rub it in," he said. "You know what really happened."

"Well, I will admit that I think it was unjust," she replied. "But that doesn't mean I can't enjoy our new relationship, does it?"

"We don't have a relationship, Teri. I was never your friend."

"Oh, but you were. How else could I have learned without all the assignments you gave me? I learned all about midwatches, about counting every fucking rivet in the hull, about doling out sheets of toilet paper, and enjoying the endless pleasures of checking quarters and heads for cleanliness. I owe you a lot, *Under-Lieutenant* Clay."

"You enjoy saying that, don't you, Commander?" Suddenly the prospect of a second slice of pie didn't seem so appealing. He started to get up.

Teri touched his arm. "Now, now, don't get yourself upset, Simon. I'm just trying to make friendly conversation. There aren't that many people around to be friendly with."

"Single men, you mean," Simon shot back. "Sorry, not interested, *Commander*."

"Don't flatter yourself. What I meant was that I wanted to make amends, sort of patch things up between us. I know I'm inexperienced, but you've got to admit I worked hard at everything you assigned me."

That was true, Simon reflected. Teri's problem could be laid to her inexperience, despite the fact that she was closer to his own age than the other junior officers. Late bloomer, he guessed. Well, she did have an excuse for being so green, coming straight from planetside duty. Sure, that would explain some of her unfamiliarity with the idiosyncrasies of *Pride*. As to the rest, well, it was almost as if she was deliberately acting ignorant.

"Yes, nobody else worked harder at screwing things up than you." He hoped his smile took the sting out of his words.

Teri smiled back. "I'll accept that." She held out a hand. "Friends?"

Simon hesitated and then took her hand. "Sure. Guess I really need somebody to talk to. I've been bored out of my mind. Depressed, too."

Teri leaned across the table and touched Simon's hand. It was a gesture of utmost sympathy, something he didn't realize he needed until it happened.

"Tell me about it," she whispered. "I can't imagine how terribly hurt you must be."

Over the next few weeks Simon found himself warming to Teri. She was a willing student, full of questions about deep-space tactics drawn largely from his experience during the war. She was a fast learner, he realized. She seemed to have a natural gift for thinking in three dimensions. Had she been younger she'd have time to develop into a skilled tactician.

"Why did you wait so long to join the Fleet?" While she'd let him do most of the talking he discovered that he knew next to nothing about her, save what had been in her thin personnel folder.

"I waited too long," she complained. "Thought I'd be a marine officer first, but that didn't work out—I couldn't handle the armor. Not enough muscle mass."

"Desk Officers don't wear armor," Simon mused. "You've got brains. They could have given you a support position."

Teri shrugged. "Uh-uh. Every marine's a combat troop, even if they're deskbound. No, when I realized I couldn't, I figured I'd best move on. Transferred to the Fleet. Took the first slot open and wound up on Dzhou. Started working in Taylor's office. Took me a year to snag a short-term ship assignment on *Pride*."

"As Win Ha's helper," he said dryly and regretted it immediately.

Teri's face flushed. She stared at him for a long moment and then bit out; "That's no damn business of yours, Simon. I do whatever's necessary, just like you."

There was no mistaking what she meant. "It *was* an alien ship, Teri. I'd stake my career on it." The words slipped out so quickly that he didn't realize why Teri's expression softened.

"You did stake your career on it, Simon. You damn well did!"

After that, making up was the best thing for both of them.

* * *

"Anything new from Intel?" Simon asked as Kit joined him for dinner.

"Nothing of note. Still haven't found the missing top section, if that's what you're hoping for. They did find out something moderately interesting in the lab, though."

Simon waited. Kit took another sip of coffee from the mug. Like all the others in the day mess it lacked a handle and had a suspicious discoloration around the rim.

Finally Simon could stand it no longer. "All right, what was it they found?" He hated it when Kit played these infantile games.

"One of the medium-sized shards had a hole running straight through it. About five centimeters wide and two high—or maybe it was the other way around." He grinned. "Same proportions as the smaller scratches and the same ninety-degree angles. They can't figure out how something could bore a hole with edges that precise through glass, especially since it takes a thirty-degree turn near the spot it exits the shard."

Simon whistled. "What the hell are we dealing with, Kit? This doesn't sound like any technology we know. And how would a glass object be able to maneuver and move that fast?"

Kit pocketed the shard. "Damn if I know. Certainly is interesting, though. By the way, the jujubes still won't admit this wasn't just a glass rock you ran into. Of course, that's coming from the brass—their scientists won't talk to ours."

"Yeah, I heard. Teri told me the other day."

Kit raised an eyebrow. "Better watch out, lad. Word's getting around that you're spending a lot of time with her. I knew her when she was in the office, y'know. Sharp, she is; always got some angle going. I'm not trying to interfere, Simon, but I wouldn't trust her too much. You know how friendly as she is with the jujube brass."

"You mean with Win Ha? She's just playing him along." Teri had pretty much admitted that.

"Maybe. All I know is that Ha-Ha pulled her off the ship to 'advise' him and act as go-between with the Fleet. Supposed to keep him posted on *Pride*'s repair and refit. Wouldn't be surprised if she isn't sleeping with him." he added.

Simon felt a brief pang of jealousy. Or was it envy? Strange, he hadn't thought of her that way, at least not seriously. "That's no business of mine."

Still, it was disturbing to think about Teri using her body as a route to advancement. She didn't seem the type of person to do that.

"All right, warning taken. I'll watch out, Kit." It didn't matter. There wasn't anything Teri could do to make his situation any worse.

"Hey, I can't blame you for trying to liven up your life with a pretty woman. Being confined to base must be getting damn dull for you."

"Dull? On the contrary, I've got a full calendar. I work out at the gym, get to watch all the entertainment I can stomach, observe the shuttles boosting off, and dine on the wonderful food they serve in the mess. How could I *possibly* be bored?"

Kit chuckled and held up three fingers. "Let me tell you, then: You're checking the inbound board twice a day." One finger went down. "You've read half the library." Another finger. "You've finished the course for the Commander's exam and probably brushed up on the Lieutenant's—not that you'd need to do that, given your experience. Of course you're bored."

Simon slumped. "All too true, but until a ship comes in I have no other choice." The truth was that he had to keep busy so he wouldn't dwell on the trial and his demotion. He still had those lingering, hellish nightmares every morning and still had to deal with their aftermath through the rest of the day.

Kit had a goofy grin on his face. "You could make a pass at Perry. I'd bet she'd take you up on it. That would make your evenings a lot less boring, I'd bet."

"Not a chance. We're just casual friends."

Kit raised an eyebrow. "She's chilled every other guy who's tried to bed her. Given the amount of attention she's giving you, I'd say there was something more than friendship involved. Look, why don't you take a shot? You'll never know unless you try."

"I've considered it," Simon admitted. What had held him back was her declaration that he wasn't her type. Of course that might have changed. No, too risky. "I'd rather keep it at the friendship level."

Kit still had that grin on his face. "Sure you would. And I've got a cubic mile of vacuum that I'll sell you. Let me up the ante here, old buddy. The Admiral's got a place on the coast. It's far away from civilization, private, and has lots of beach and forest to wander in. I think I could arrange for you two to fly down. Taylor wouldn't mind."

The idea was appealing. "You wouldn't get into trouble, would you?"

"Don't be stupid. This is Taylor's idea. He used the demotion to keep you out of the jujubes' hands. Felt terrible about how he had to shaft you. So, what do you say—want to go?"

"I'll think about it," Simon promised. Yeah, and see if Teri would be interested as well. He was pretty sure she'd like a vacation away from Win Ha.

A few days later he mentioned Kit's offer of Taylor's private retreat to Teri.

"Hey, I know that place. Taylor took some of us there last year. It's a secluded place on the beach. I'd give anything to go there again."

Simon took a deep breath. "Kit says he can let me use it for a few days. Said I needed a vacation."

"Any chance you'd take me along?"

Simon started. After trying to work up nerve to ask her for days it turned out to be easier than expected. "I could ask," he answered stupidly. "Uh, that is, if you want me to."

Teri smiled and pecked him on the cheek. "Of course I do, you idiot. You have to be the densest man I've ever met. Why the hell do you think I've been spending so much time with you?"

"Friendship?" Simon felt like he'd been hit with a hammer. And it felt good.

The burst from the Fleet ship arrived during second watch, long after most of the base was in bed. "Supply Ship *Humphries*, inbound from Theta, expected arrival in four hundred hours." There followed a long bill of lading detailing the supplies destined for the Fleet at Dzhou, the crew manifest, and a list of supplies she'd require before departing to her next port of call.

The watch officer duly noted the burst, annotated the inbound log, and submitted the requirements to the base's supply system. Then he went back to reading about the Fleet's battle off Heaven during the civil war. It didn't read like anything he remembered from that engagement. His own experience was far less exciting and a hell of a lot more frightening.

Kit's call roused Simon from a dream of floating free in space, fighting hand in hand with rebel colonists. That the rebel whose air hose he had just severed resembled Captain Win Ha had only added to the dream's pleasure.

"Your ship's finally coming in," Kit said as soon as Simon answered.

"What?" Simon said grumpily. Then the meaning of what he'd just heard sank in. He was fully awake in seconds. "When?" he shouted. One of the Fleet's ships must have been close by to pick up that emergency burst Taylor had sent about the aliens. What type would it be—a Hellion-class frigate, a battle-hardened Destructor, or one of the monstrous Designators?

"It's *Humphries*," Kit continued without pause. "She should dock in a little under four hundred hours. Better take Taylor up on the offer soon. I understand *Humphries* is a pretty old ship. You might need some pleasant memories to fall back on."

"Old ship?" What the devil was Kit talking about?

"Supply ship," Kit replied. "One of the freighters that got converted during the war, I understand."

Simon's heart fell. "Freighter?" Somehow he couldn't resolve this as the ship he'd have to join. "There must be some mistake."

"Sorry, old buddy, but *Humphries* is the first ship to arrive and you are stuck with it. Anyhow, say the word and I'll get you going on your vacation."

Simon tried not to let his disappointment at the news affect his voice. "Thanks for calling, Kit. I'll let you know about . . . No, wait a minute." Damn it, he deserved to get something back from Taylor! "Sure, why not?"

"Right, old buddy. I'll shoot you the specs on *Humphries* and figure out how to get you assigned on, let's see, remote duty—that should cover you for the vacation without violating regs. Hey, I just had a thought—*Humphries* might be an opportunity to earn your bars back. Damn few good officers in the supply Fleet." With that cheery addition he clicked off.

"Who was that?" Teri murmured sleepily as Simon lay back down.

"A surprise," Simon answered. "I'll tell you in the morning." Just at the moment he didn't feel like talking.

A *supply* ship!

Teri had raced around to pack and get ready for their vacation. "I forgot about my schedule—Win Ha wants me to go up to *Pride* with him to check on progress. But let me make a few calls," she answered. "I'll see if I can move the schedule around so we do that the following week."

"Don't tell Win Ha about where we're going," Simon warned as she turned to go.

"Silly. I wouldn't do that."

Kit Wilkerson was a wonder. He called Simon at the Officer-of-the-Day office. "We'll drop you at night—less chance of somebody seeing you. I gave the caretakers a week off and there's always guards watching the gate. Nobody's going to bother you."

"That's an awful lot to do for a—"

"Would you cut the crap? Like I said, Taylor feels bad about busting you. Chalk it up as payback and have fun." Kit paused and elbowed Simon. "Give her a couple of good ones for me, eh, you lucky dog." With that, Kit clicked off.

Simon set the phone back down, smiling that someone else realized what a prize Teri was. At the moment he didn't know which excited him more—having Teri all to himself for a week or getting his feet back onto a Fleet deck, even if it was only a damned supply ship.

Simon signed out for the day, and headed for his quarters. He was surprised to find that Teri had already packed his belongings. Teri stepped out of the bedroom. She was wearing her uniform and had a flight suit over her arm.

"Where are you going?" he exclaimed when he saw her. "We're leaving in a couple of hours."

Teri smiled. "Sorry, I have a quick meeting with Win Ha. I'll meet you at the plane. Hey, don't look so sour, after all you'll have me all to yourself for a whole week. Don't begrudge Captain Ha-Ha a few hours."

"You know how I feel about that asshole."

She came close. "And you know how I feel about you."

He took her in his arms. "You are a wonder."

"Well, here's something to tide you over." Teri put her arms around his neck and pressed close. For a long moment he didn't think of anything except the pleasures of lips and tongues and the warmth of having her so close and . . .

"Whoa, boy. Let that wait until later." She wrinkled her nose. Teri danced away, laughing. "Phew, right now you need to shower and get dressed. Well, gotta run. See you at 2200. Don't forget my bag!"

Peng awoke to the chiming of his personal call. "I'll need that transport you promised next week," Win Ha said without preamble. "All the principals are finally in place. It'll have to be a VTOL scramjet instead of a shuttle, though. According to my source, the field's not very long."

Admiral Peng smiled as he clicked off. He was quite satisfied that things were progressing so well. He was especially pleased that Win Ha was finally acting like the officer he wanted him to be.

He would have to tell Senator Ma how well things were going

Teri and the pilot were waiting by the plane when Simon showed up with the bags.

"Toss those in the back," the pilot said. *Webster*, the nametag read. "Perry and I will be riding up front."

"Helen and I came to Dzhou together," Teri explained. "She offered to let me ride in the copilot's seat."

Helen stuck out a hand. "Well, I can see why Teri's been so unavailable lately." She grinned as she swept Simon from head to foot. "Pleased to meet you, Under-Lieutenant."

Without a pause she continued. "Since this is officially a training exercise, we'll be going in on a secure drop. We'll fly high until we're near the target then I'll cut engines and glide to about six hundred meters, flip on the electrics and do a silent landing—no lights. I've planned this so we hit just before that speck the Dzhou call a moon rises."

"She's telling you this because it's a little hairy the first time," Teri added. This surprised Simon. He didn't realize Teri knew that much about flying.

"All right, let's strap in and lift off," Helen said and pulled her helmet over her head.

"Hairy" wasn't a word that Simon would have used to describe the sudden drop when the engines cut off, the screaming of air around the otherwise silent craft, nor the stomach-churning twisting and turning as they plunged toward the ground for what seemed like hours.

Then the jolt at the end that felt like a horse had kicked him in the ass, sideways-skewing movement, and the jolting stop as the wheels touched the ground.

Teri was out of her seat in a second. "Come on, quick, Simon. Toss the bags down here."

Simon could barely make out her form in the darkness, but did as she said before climbing down himself. No sooner had his feet hit than the plane lifted off. In seconds she was airborne and away, silent as owl's wings.

There was a click and suddenly there was a pool of light around the bags. "I think the path is over that way," she said. "I'll hold the light while you grab the bags."

Simon was surprised to see white sand instead of a grassy field. Then he noticed the waves hitting the beach. "Where . . ." he began.

Three dark forms appeared suddenly. The closest one was directly in front of them while two more were spread on either side. "This is a restricted area," a gruff voice barked. "Identify yourselves."

"Commander Perry and Under-Lieutenant Clay," Teri said. "The pilot decided to drop us on the beach instead of the field."

"Can you show me some identification, sir?" the voice said, a little less gruff this time.

"Hold the light." Teri handed the light to Simon and then unzipped her flight suit. Simon gulped. Underneath she had on a very small two-piece. "Here you are, sergeant," she said, handing over her id tag.

"Corporal, sir." The corporal's hand shook a little as he took the tag. "Everything seems fine, sir," he said with barely a glance at it.

Simon considered the way the two on either side stayed their distance. Probably there were two more back there in the darkness, out of sight. The spread was designed to give them each a clear lane of fire. Excellent tactics, he thought.

"My tag?" Teri said and held out her hand.

The corporal seemed confused, whether by the pilot's choice of landing sites or by the amount of feminine flesh before him. Must be damned lonely out here in the boonies, Simon thought. But he had to admit that the sight was affecting him as well.

"Sorry, sir," the corporal said. "Let's go!" The three marines faded into the brush.

"You're such an asshole, Reilly," a female voice cut through the night. Apparently the corporal's duty wasn't too lonely after all.

"What did I tell you? Doesn't the Admiral like to live well?" Teri wandered around the room and ran her hands over the chair backs. "I wonder," she said quietly, "what the bedroom must be like?"

Simon dropped the bags. "Well, let's check it out. We can unpack in the morning."

"Or later," she laughed, and raced him up the stairs.

Senator Ma was quite pleased at Peng's news. Thank heavens he'd suggested that Tu'un invite Taylor to accompany him on tour earlier. This would fit nicely with Peng's plan. The Admiral's absence from headquarters might delay the Fleet's reaction to the kidnapping. Yes indeed, he thought, Things were coming together quite well.

The embarrassment Peng's trial of the officer would cause only added to his pleasure. Yes indeed, a show trial would tell Senator Mn Ha who held the real power in the council.

Time passed in a blur for Simon. They spent time on the white sand beach, tossing shells into the sparkling blue waters, swimming, and just lying in the sun until they were both brown as nuts.

In the evenings they liked to walk in the thick growth of forest, smelling the rich damp duff that lined the forest floor and watching the arboreal animals that chattered and screamed at them. None of the fauna in this part of Dzhou, it seemed, grew larger than an Earthly squirrel.

After dark they would sit on the patio, staring up at the stars as the damp sea breeze blew onto the land. In the distance they could hear the soft beat of the waves and the chirping of the nocturnal animals. Faintly they could hear the rustling of the leaves and grasses. The vegetation grew so large that Simon sometimes wondered if it was the breeze or the swiftness of their growth that made the sound.

"Where do you think it came from?" Teri wondered absently as her finger went from star to star.

"Thought you didn't believe in my alien," he said. "Well, you're not the only one. At least I've kept my commission."

Teri sat up. "Simon, I know it's a damn shame, losing your rank. But you'll get it back. You'll make out all right. The cream always rises to the top in the Fleet."

"Yeah, right. A freaking freighter will provide endless opportunities to use my tactical experience, won't it? Ah, the hell with it. This is a vacation." For an entire day, he'd managed to put the past completely out of his mind. Now, it all came back—the guilt, the dead crew, the trial—everything.

"I do believe you, Simon. The evidence is too overwhelming to deny." She stroked his cheek. "Come on, answer my question: Do you think we'll ever find out where it came from?"

Simon softened. "Honestly, I don't know if the encounter was a one-in-a-million coincidence or if that damned iceberg was the leading edge of an armada. I've been wondering about that ever since I first saw it.

"The idea of an alien race scares the hell out of me," he continued, warming to the subject. "We have no way of assessing what they might do, how they might react, or how they might interpret our actions. What if they all attack us, like that one did to *Pride*? How do we deal with something like that?"

"Don't be such a pessimist," Teri answered. "Maybe they'll welcome us with open arms, or whatever equivalent they may have. I should think that a race that has achieved interstellar flight would be advanced enough to see the benefits of cooperation."

"Like the colonies?" Simon scoffed. "Humanity can't even cooperate with itself, so I have little doubt we'll behave any differently with another life form. Maybe the aliens are the same way. It sure looked that way when that thing rammed me."

"Maybe you spooked it," Teri said.

Simon pulled away. That was his greatest nightmare, that his actions, his warning shot had caused the alien to react so violently. God, why couldn't he accept his own rationale for why he had done what he had? Why did he feel this enormous weight of guilt?

"Look, a meteor trail!" Teri's finger traced a path across the sky until her finger touched Simon's lips. "But we only have a few more days. Let's try not to talk about the Fleet, aliens, or anything of any consequence."

Simon kissed her fingers and drew her arms around him. "Nothing of any consequence it is, Commander."

And for a while, the guilt went away.

Kit called every afternoon to check on them, even though Simon doubted it was necessary. Since Taylor used this place to entertain Dzhou politicians, he was pretty certain that the Admiral's house was outfitted with all manner of surveillance gear. He just hoped that the bedrooms didn't have hidden cameras. He'd hate the thought of some anonymous security Rating watching his performance.

Or Teri's.

"They're making some progress on the debris," Kit reported in one of his morning calls. "The big chunk, the one they think came from the ass end of that thing, has some interesting properties."

Rather than try to wait Kit out, his usual game, Simon asked immediately. "Such as?"

"Seems the interior isn't quite as homogeneous as they thought. Under polarized light it looks as if there are fracture planes separating the chunk into distinct regions."

"That doesn't sound terribly interesting to me," Simon said.

"Yeah, that's what I thought. But it seems that these things are more than decorative. Intel thinks this is a piece of whatever drove it. Maybe a dielectric thingamajiggy."

Simon decided to challenge Kit's technical slang. "Or a whatchamacallit?"

"Something like that. Anyhow, the scientists now think this was a machine, but based on principles we don't have an inkling of knowing."

"A machine? The thing didn't act like a machine—more like it was under intelligent control."

"Well, that's your opinion. Listen, I've got to run now. I'll call you whenever I get some more news."

Simon was returning from the beach with a fresh fish for dinner when he overheard Teri talking. "Right," he heard her say. "Don't worry. I've got everything under control."

He pushed open the door. "Look what I have."

Teri's reaction was less than enthusiastic. "Are you going to cook that thing or do you expect me to do it?"

"I'll clean it if you cook it," he replied. "Did Kit call while I was fishing?" It would be unusual for him to call twice in one day.

"Kit didn't call," she replied. "It's a little early for that anyway. He usually doesn't call until late afternoon."

"Yeah, right. I just thought I heard you talking to someone, though."

Teri smiled. "Just business, darling. Don't give it a thought."

Win Ha could scarcely keep the glee from his voice when he called Peng. "I think we need to move soon. A ship is due to arrive within two days and Clay is off the base. I have to get to him now, before he gets back to safety."

"You continually amaze me with your resourcefulness," Peng replied. "The arrival board shows *Humphries* is still three days out."

"I have a better source," Win Ha said with ill-concealed impatience. "Now, can you have the transport on the ground at Taylor's estate tomorrow night? My agent assures me the little bastard doesn't suspect a thing."

"The plane will be unmarked, but obviously military. It would be difficult to hide a scramjet, just in case you've forgotten."

Win Ha didn't catch the insult. He felt the thrill of anticipation. Soon, he would see Simon Clay humbled by an honorable military court, one the Fleet did not control, one where Clay wouldn't be protected by Taylor. By the heavens, he'd put the man in chains, send him to prison, and then rub the Fleet's face in it.

The punishment of Simon Clay would serve as an example of what happens when proper Dzhou authority is flouted.

Kit's early morning call was a surprise. "Is Teri around?" Kit asked immediately.

"No, she's out walking the beach."

"Good. Listen, we just got word that the jujubes are going to try something so we have to get you away from there. I'm pulling you out tonight."

"Why don't you just beef up the marine guards?" Simon asked.

"Already did that, but there's too much beach and too many trails in the woods. Besides, Taylor wouldn't like a confrontation—somebody's likely to get killed."

That made sense. The last thing he wanted was another death on his conscience. "All right, I'll tell Teri the bad news."

"Tell me what?" Teri said from the porch.

Wilkerson must have heard her. "Just be ready to get the devil out of there when the time comes. Stay inside until then."

Simon replaced the phone. "That was Kit. Said they've learned the jujubes are going to try to arrest me. He needs to get us back to the base."

There was a strange expression on Teri's face. "Did he say how he found out? Was it Intelligence or what?"

"He didn't really say. But I trust him."

Teri swore.

Simon knew the reason. "I know how disappointed you must be, sweetheart, but it had to end some time." He put his arms around her, breathing in the sweet smell of her hair, feeling the smooth silkiness of her skin. "Looks like this will be our last night."

Teri softened and snuggled close. "And then you'll be gone forever, never to see me again, never to kiss me again, never to . . Ah, what the hell—let's pack and then do something we'll both remember for a long, long time."

There was no arguing with her logic; that was certain. Simon was glad they'd remained good friends, and had managed to avoid the messy romance thing. At least he had. Oh, he'd be sad to leave her behind, but he wouldn't be heartbroken over it.

At least he hoped so.

Teri apparently couldn't sleep. She was up and down, rousing Simon to half-wakefulness each time. He had no idea of what she might be doing, but thought it might have a lot to do with Kit's news. She seemed a lot more upset about this sudden end to their vacation than he.

A plane screamed over the house, startling both of them awake. "What the devil was that?" Teri exclaimed. "Sounded like a scramjet."

Simon was into his clothes in seconds. "That must be our transport. Grab your bag. Let's go!"

Teri was swearing loudly as she slipped into her one-piece and picked up her bags. "Damn it, Simon. This is highly irregular. I could have checked with the base about this."

But Simon wasn't listening. He was already out the door.

They ran to the strip, trying to keep their bags from snagging on the shrubs lining the path. Simon could hear the scrammer slowly turning. Even a VTOL needed use of the short strip to take off. The whine of the engines was almost painful. Simon could smell the excess fuel from the scrammer's exhaust.

The hatch popped open. Simon threw his bag inside and then tossed in Teri's.

"There's no markings on the plane," Teri exclaimed. At that moment Simon noticed a group of armed men running up the beach toward them.

"Get in the plane," Teri shouted, shoving the middle of his back. Simon stepped inside and turned to give Teri a hand. She was fumbling with something in her pocket. He was startled to see her pull out a small handgun. "What the devil?"

"Shut up and sit down," she ordered as she slammed and dogged the hatch, pushed past, and squeezed through the narrow opening to the cockpit. "Hello there," he heard her say brightly just before there was a soft cough and something clattered onto the deck.

The marines were pounding on the hatch. "Open up!" came the muffled cry.

Teri poked her head through the hatch. "Ignore them. Here, strap him in one of the seats and then make yourself secure." The limp form of the pilot fell into his arms.

"Teri, are you out of your mind?"

"Simon, shut up and strap him in. I've got to get this thing airborne."

"You don't know how to fly something like this." No sooner were the words out of his mouth than the pitch of the engines started to rise. Had she gone insane? The plane shuddered as the engines torqued up.

Simon threw the pilot into the port seat and strapped him down. It was a relief to see that he was still breathing. At least Teri hadn't killed him.

The scream of the engines was nearly intolerable, even in the closed compartment. The scrammer started to move. Simon barely had himself secured when he was slammed sideways. A second later he felt the hard seat press firmly against his buttocks as the plane shot up. Obviously Teri knew how to take off.

He just hoped she also knew how to land.

The jet continued to boost for what seemed like an eternity. As the engines cut off and the pressure on his seat lessened Simon blew out a sign of relief. That meant the scrammer had reached the top of its flight path and was now going to start falling toward their destination. Although he desperately wanted to find out what was going on, there was nothing he could do now but see where Teri was taking them. He certainly wasn't going to distract her in mid-air.

Instead of falling back to the base, the scrammer's big rockets fired. Simon was slammed back from the sudden acceleration. The rocket boost meant she was pushing them out of the atmosphere!

After a while, the big rockets shuddered, coughed, and then were silent. And then they were either falling or orbiting. Simon fought down a moment of nausea at the sudden onset of free fall.

"Doing all right back there?" Teri shouted. "Take a peek at our guest. Make sure he's not choking."

Simon checked to see if the pilot was still breathing and then noticed something strange. His flight suit didn't look like a Fleet uniform. In fact, it definitely looked Dzhou. It even had jujube insignia. None of this made any sense. Why had a Dzhou been piloting the scrammer?

There was a hard jolt and a metallic grinding noise. Simon knew that sound. It was a rendezvous with another craft.

The hatch popped open with a loud clank. An armored Fleet marine stepped through. He had a wicked pneumatic P-85 in his hand. "Clear!" he yelled after a glance at the unconscious pilot.

Another marine and an officer put their heads through the hatch. "You all right, son?" the Light-Colonel said as his marines gently passed the unconscious pilot through the hatch.

"I think so, sir. May I respectfully ask what the hell is going on here?"

The Colonel, looking beyond Simon, ignored his question "Ah, glad to see you haven't lost your edge, Teri. Brought her in right on target."

"Thanks, Fred. You were a good teacher," Teri answered as she pulled herself, hand over hand, from the cockpit. She glanced at Simon. "I think Under-Lieutenant Clay's a little dazed though. I suggest we get him on board your boat before he explodes from curiosity."

Tu'un was lazily feeding his fish when Schwen Wei arrived for dinner. "I trust everything went as expected," he said after greeting his guest.

"Even better," Schwen Wei answered. "The irritant is safely away, Senator Ma has been dishonored, and Fleet has discovered the identity of Peng's informer. I am certain Fleet intelligence will be more gentle with Wilkerson than Ma will be with poor Admiral Peng and his man."

"Yes, Senator Ma does not tolerate intemperate fools," the Premier answered. "No more than I can have someone on the inner council so openly defy me." He paused. "The Council values honesty and loyalty. I doubt Senator Ma or his faction will soon regain a position of influence."

"A pity. But one earns his own rewards," Schwen Wei said as he accepted an excellent brandy from Premier Tu'un.

"Now, as to the matter of the alien vessel."

Tu'un shook his head. "The *alleged* alien object, you mean."

Schwen Wei sighed. "Between us, old friend, there is no need for pretense. We both know that was no accidental encounter, that the samples Taylor provided could not have been created by natural processes. There is another space-traveling race out there, another civilization that we must deal with."

Tu'un admitted nothing. "Even if it were an alien machine, what does it matter? Look, the human race has been expanding for over a thousand years and not once have we encountered evidence of alien intelligence. Now we have a single event, an encounter with what looks like some sort of machine and we are supposed to act as if they will be arriving within days or weeks? The whole idea is ridiculous."

Schwen Wei frowned. "Perhaps you are right, Premier, but can we take that chance?"

"It may well be another thousand before we make another accidental contact. We have more than enough time to consider our options, to discover all we can of this thing. There is no reason for us to be precipitous."

The Premier filled both their glasses. "Now come, let us talk of more pleasant matters. One needs more than the satisfaction of a job well done, my friend. Perhaps a title would be appropriate reward? Or would an honorary commission be more suitable since you are so anxious to face the alien horde?"

Schwen Wei had to grin at Tu'un's jibe, but there was a kernel of truth in what he said. "I am a modest man, sir. I exist only to serve." He paused. "But a commission would help me serve better, I think." They both laughed at that. "It would be a great honor to command *Pride of Dzhou*."

The Premier was taken aback. "But I was jesting. How would you hope to manage such a vessel? You have no military experience."

Schwen Wei smiled. "Neither did Win Ha. However, you need not fear. I have an excellent prospect in mind to assist me."

"I am sure Commander Perry will be very happy to hear that," the Premier said. Obviously he had his own sources of information.

The revelation of Teri's combat background had shocked Simon to the core. Gods, how stupid he must have sounded when he was talking about his own war experience! She must have had a hard time keeping from laughing.

What was worse was the discovery that she was assigned to protect him. Protect him, for God's sake! How embarrassing.

The boarding klaxon sounded. *Humphries* was waiting. "I'm going to miss you, sir," Simon said quickly.

"And I'll miss you too, Simon. Last week was wonderful, although I damn near had a heart attack. You'd be Dzhou dog meat by now if I hadn't maintained contact with Intel."

"And for that I will be eternally grateful, Commander."

"Please, Simon, right now, just call me Teri."

Simon smiled. "So there was something between us. I wasn't just an assignment."

Teri's eyes sparkled. A smile played on her lips. "Sure it was. You've been fun, but as I said before, you're *really* not my type."

But her farewell kiss said otherwise.■

HAL CLEMENT, 1922-2003

Harry C. Stubbs, better known in science fiction circles as Hal Clement and for his astronomical art as George Richard, died in his sleep on October 29, 2003, at his home in Milton, Massachusetts. Born May 30, 1922, in Somerville, Massachusetts, he grew up in Boston and earned degrees in astronomy, chemistry, and education. He served as a bomber pilot during World War II and remained in the Air Force Reserve until his retirement as a lieutenant colonel in 1976. He was a high-school science teacher for most of his adult life, principally at the Milton Academy, and generated just as much enthusiasm for the sciences through his writings as in the classroom.

Hal Clement is best known in our field as one of the foremost practitioners of "hard" science fiction, meticulously crafting plausible but very alien worlds and lifeforms in such novels as *Mission of Gravity* and *Needle*. Many of his stories appeared in this magazine, from "Proof" (often considered the first successful science fiction mystery) in the June 1942 *Astounding*, to "Under" in the January 2000 *Analog*. His emphasis on scientific background led some readers to believe he had little interest in character, but I once had the pleasure of doing a workshop with him on science fiction writing for young people, and he had more to say about characterization than any other single topic. He was always interested in sharing his knowledge and enthusiasm for both science and science fiction, and will be fondly remembered by many who met him at conventions, and by "Hal's Pals," the writers' group with which he met right up to his death.

He is survived by his wife, Mary Elizabeth Myers, sons George and Richard, daughter Christine, and grandson Jackson, to all of whom we extend our sincerest condolences.

—Stanley Schmidt

THE REFERENCE LIBRARY Tom Easton

Beyond Infinity, Gregory Benford, Warner, $23.95, 338 pp. (ISBN: 0-446-53059-X).

Frek and the Elixir, Rudy Rucker, TOR, $27.95, 476 pp. (ISBN: 0-765-31058-9).

Wellspring of Chaos, L. E. Modesitt, Jr., TOR, $27.95, 400 pp. (ISBN: 0-765-30907-6).

The Salt Roads, Nalo Hopkinson, Warner, $22.95, 394 pp. (ISBN: 0-446-53302-5).

A Chance to Remember, Ramona Louise Wheeler, Betancourt & Co., $34.95, 305 pp. (ISBN: 1-59224-602-8).

Business Secrets from the Stars, David Dvorkin, Betancourt & Co., $34.95, 350 pp. (ISBN: 1-59224-606-0).

Aurora: A Child of Two Worlds, David A. Hardy, Cosmos, $15.99, 223 pp. (ISBN: 1-59224-201-4).

The Chesley Awards for Science Fiction & Fantasy Art: A Retrospective, John Grant and Elizabeth Humphrey, with Pamela D. Scoville, Artists' and Photographers' Press Ltd. (10 Hillside, London SW19 4NH UK; www.aappl.com) (US distributor: Sterling Publishing), $45, 192 pp. (ISBN: 1-904332-10-2).

The Art of John Berkey, Jane Frank, Paper Tiger (US distributor: Sterling Publishing), $29.95, 160 pp. (ISBN: 1-84340-122-3).

In 1990, Gregory Benford published a novella, "Beyond the Fall of Night," to accompany and continue Arthur C. Clarke's "Against the Fall of Night," but he wasn't entirely satisfied with the result. So he tripled the length, dropped or rearranged the elements of Clarke's future world, added in the latest theoretical physics about a universe with multiple dimensions, and came up with the thoroughly fascinating distant, distant future, world-ending threat, and fantastic resolution of **Beyond Infinity**.

The time is billions of years hence, when young Cley is growing up in a communal society. She has many moms and no dads, though she has learned who her biological father is, and that he vanished years ago, which provides her with a mystery and an obsession. Cley's folk are Originals, meaning not quite folk like you and I, for they carry genetic and electronic enhancements. But they are closer than anyone else alive to our type, whose specs have been long lost in the mists of the eons. Even the Library of Life, where Cley in due time goes to work, has no information. But she acquires a lover, Kurani, a Supra of prodigious evolved and engineered enhancements and lifespan, and learns something of the Earth's other peoples—sentient elephants, for one!

And then everything falls apart. Strange forces attack Earth, focusing on the Library and hunting down and killing all the remaining Originals. All but one—Cley, of course. She is damaged, almost killed, but a strange being named Seeker, descended from enhanced raccoons, succors her. Soon she is hard at work, salvaging what remains of the Library's treasures, and wondering what the attack was all about. The attackers seem to have been extra-dimensional beings of some sort, and there is talk of an enormously powerful being, the Malign, which has taken it upon itself to cleanse the galaxy of sentient life. She also hears of the Multifold, which was created in ages past to contain the Malign.

Before long, Cley is chafing under the condescending patronage of the vastly superior Supras. She and Seeker run away, ride a tree to space, hitch a ride on a Leviathan—a living spaceship—and discover that the eons have seen life move from Earth into space, first in engineered form, and then in an explosion of evolutionary adaptation. Benford's vision is enchanting, but he gives us little time to savor it. Soon it is clear that the Malign is following Cley. It has escaped its ancient prison, and now it's out to get her, for she is somehow the key to defeating it. Kill her, and all the galaxy is prey to its evil.

There are mysteries here. How can one lonely and immature, unenhanced (relatively) Original human possibly be the key to preventing the End of Days? And just who is Seeker, who seems to know far too much and be far too much in touch with great events for a mere hopped-up raccoon? And—remember the basic rule of fiction: never to put something in unless it will play a later part—just when will Cley's missing father pop up, and what has he got to do with everything?

If you like hard-SF adventure of cosmic sweep, Benford never fails to deliver. This one's a must-have, and it may very possibly earn him a third Nebula Award.

Rudy Rucker has a reputation for the weird and wonderful, and if that's enough to rev your rockets you'll be delighted to hear that **Frek and the Elixir** is out. The year is 3003, and things are rather different. Rucker supposes that current worries about corporate patenting of life forms have been fully justified: It is some 350 years since NuBioCom "discontinued" all Earth's native lifeforms (except for humans). Only NuBioCom's designed, patented, produced, and approved critters are left. Dogs exist in yearly models. People live in housetrees and eat anymeat, the fruits of the allfruit tree, and the half dozen canonical vegetables in the garden. Every district is ruled by a Gov, which is actually an engineered parasitic worm.

A rather nasty place, eh? But meet Frek, just an ordinary twelve-year-old boy growing up with his mother and sisters. His dad got in bad with Gov the year before and fled to space. Cleaning his room, Frek spots a strange device under his bed. The cartoon characters on the wallscreen tell him a flying saucer has arrived and is looking for him, but before he can make the connection, Gov's "counselors" show up to interrogate him. They want to know why the saucer is looking for him, where the saucer is, and more. When the poor boy doesn't cooperate, they threaten him with a "peeker uvvy" (braintap), which tends to do permanent damage.

When Frek finally looks under the bed, the saucer produces a miniature cuttlefish that tells him it's up to him to save the world. That's when Gov's minions stomp in, kill the alien, confiscate the saucer, and slap the peeker on the kid.

But Frek recovers. He flees, acquires an odd friend, and manages to learn a bit about what's going on: The aliens of the saucer, the Orpolese Bumby and Ulla, want him to designate them as the producers for the Earth show, which is "watched" via hyperdimensional braintap by aliens throughout the galaxy. If he cooperates, they promise, he can have the "elixir" that will restore Earth's lost biomes. And oh, by the way, Frek's dad is with another group of alien would-be producers, the Unipuskers. Gotta move fast, boy. No time to reflect.

Just say yes and shake on it.

There are complications, of course. No matter what the Orpolese, the Unipuskers, or—later—the Radiolarians say, they are not concerned with Frek's or humanity's welfare. But the kid has hidden talents, acquires useful friends, and eventually triumphs. It even looks like he and his fourteen-year-old girlfriend Renata just might live happily ever after. But there's not much of substance here for the demanding reader. The plot and the characters are more suitable for cartoons, and Rucker's sole serious point—the hazards of cultural monoculture—gets a cartoon level of discussion.

Weird and wonderful, sure, but very light.

L. E. Modesitt, Jr., never fails to deserve praise, and the twelfth novel in his popular Saga of Recluce—**Wellspring of Chaos**—is no exception. The basic conceit is the nature of magic as the direct manipulation of order, presented here as a matter of fiddling with the little hooks between the particles of air or water or iron (yup, physics and chemistry). Talent is necessary, but much can be learned and taught. Modesitt's magic is not a matter of incantations and appeals to gods or demons.

So meet Kharl. He's an excellent cooper in Brysta, whose ruler has a corrupt and vicious son, Egen. One evening, Kharl hears a commotion in the alley outside his shop, intervenes, and saves a neighbor's daughter from rape by a pair of velvet-clad toffs. A little later he discovers a blackstaffer from Recluce in another alley, beaten and raped, and a scrap of velvet clutched in her fist. Blackstaffers—mages—are from Recluce, and people distrust and fear them. But he takes her into the shop despite the protests of his wife, who thinks doing the right thing is all well and good, but he really should be thinking of the effect on his family and livelihood. A few days later, someone torches his neighbor's shop. While he is helping to fight the flames, the blackstaffer is murdered.

And Egen promptly shows up to arrest Kharl for the deed. Fortunately, the local judge merely orders Kharl flogged. But his wife is declared guilty and hanged. His sons leave home. The taxman shows up with a monster bill. Kharl must abandon his shop and trade, hide out in the slums with only the blackstaffer's staff to lean on and manual, *The Basis of Order*, to study and an urchin beggar for company, and hope to survive until a friendly ship makes port and he can escape Egen's further fond attentions.

The ship arrives; Kharl becomes a ship's carpenter and continues to do the right thing. He studies *The Basis of Order* and discovers a talent. And in due time he becomes an impressive mage. How will he use his powers? He's never been mad for power or wealth. He's craved only a peaceful life doing what pleases him—making barrels—and doing the right thing when the need arises. But there is the question of revenge, and he has been told that before he can be happy he must return to Brysta. Since he doesn't manage to do that in this volume, we can expect another, which is sure to please Modesitt's many fans.

If the title makes you wonder, by the way, at various points Modesitt says that the *Wellspring of Chaos* is wealth, order, wizards, Hamor (a country), and doing right thoughtlessly. Perhaps the next volume will add the search for revenge.

Nalo Hopkinson's latest superlative offering is **The Salt Roads**. It's fantasy, but as we have come to expect from Hopkinson, it is not conventional fantasy. Her concern remains the African experience in history, rooted in the abuses of slavery and racism and centered on the Caribbean versions of both but reaching here to the France of Baudelaire and the Egypt of the very early Christian era.

The Caribbean component is the

most heart-wrenching, for here is the slavery of the sugar-cane plantations of Saint Domingue, as bad as or worse than anything in the American South. Meet Mer, a healer woman; Tipingee, her sometimes lover; and Georgine, caramel instead of black, employed in the great house, eager to assume the airs of greater station, mated to a poor white man, and now in the throes of childbirth. Alas, the babe is stillborn, and the three women must bury the body on the riverbank.

And so is born Ezili "from song and prayer. A small life, never begun, lends me its unused vitality. I'm born from mourning and sorrow and three women's tearful voices. I'm born from countless journeys chained tight in the bellies of ships. Born from hope vibrant and hope destroyed. Born of bitter experience. Born of wishing for better. I'm born . . ."

Voudoun culture knows Ezili as a loa (here, "lwa") or goddess drawn from a blend of African and Caribbean traditions. She is Virgin, Mother, and Lover, and she represents the transformation of African spirituality in the Diaspora, the blending of Old and New Worlds, African and European, Voudoun and Catholicism. All of these components are visible in *The Salt Roads*, from the initial Mother, who rides Mer and urges her to find a path to spirituality despite the historical currents leading to rebellion and massacre; to the Lover, Lemer, the Jeanne Duval who is Charles Baudelaire's mistress, whom Ezili also rides and struggles to impel toward happiness; to the Virgin, Merite, a Nubian prostitute in Alexandria, property of a tavern-owner, who runs away to Aelia Capitolina (Jerusalem), miscarries on the threshold of the Church of the Sepulcher, turns rather spooky under Ezili's reins, and thanks to the impressionability of a wandering monk becomes known forevermore as Saint Mary of Egypt, the "dusky" saint.

On one level, the tale is three tales, of Mer, Lemer, and Meritet, each woman moving from pain though struggle toward some measure of happiness. On another level, the tale is one, of Ezili, a goddess learning her trade. She is born in the mid-1800s, proves able to hop about in space and time, encounters other loas such as Ogu, who also wishes to free the Africans but through violence, and learns that the Africans of the Diaspora, the Ginen, are a sturdy, adaptable people whom no blight can cover completely.

At the same time, Hopkinson reminds us through the others around Lemer and Meritet that the tribulations of the Ginen are not for the Ginen alone. Lemer is surrounded by dancers who sell their bodies and dream like her of a marriage to lift them into respectability. Meritet's friends are tavern whores such as Judah, who dream of freedom; in Judah's case, there is an uncle near Jerusalem to whose farm he and Meritet may someday repair.

The tale is thus not just for those who share the African heritage of color and abuse. It is for us all, and Hopkinson well deserves the acclaim heaped upon her.

This year's first issue of *Analog* had Ramona Louise Wheeler's "Inherit the Vortex," the latest installment in her long-running series of Ray & Rokey tales. Now she gives us the first Ray & Rokey novel, **A Chance to Remember**, in which the excitement begins immediately. Shipwrecked, rescued by pirates, and fallen in with Wystan Whytock II, who hunts those despicable meat-hunters who crave the high prices folks pay for dino-burgers, the human Ray Harris and the self-exiled Wozurn noble Lord Rokhmyr soon find themselves having to protect a young sentient species from the illegal pet trade.

If you like Ray & Rokey, you'll be delighted.

Though surely not as much so as the author's friend who will find herself happily Tuckerized as a Wozurn spaceship captain.

I loved David Dvorkin's title for his latest novel. How could anyone resist **Business Secrets from the Stars**? The bookstores are so full of New Age woo-woo and absurd self-help books that a parody just has to be good for a few laughs, especially since I remember my computerized psychic (closely related to the computerized poetry generator I described in the April 1988 *Analog*), which tempted me to hook my computer and a speech synthesizer to a 900 line. Fortunately, my sense of shame stopped me . . .

Not so Malcolm Erskine. He's a midlist writer who quite deserves his lack of sales. He's also quite jealous of more successful writers, bitterly divorced from a grasping wife who thought "writer" meant "rich," and a whiner. But then he comes up with Lukas of Aldebaran, ancient business magnate in a prosperous empire, who's just begging to be channeled. So Malcolm cobbles together a load of nonsense, stealing liberally from the seminars he has been forced to endure at Western Bell (where he labors as a programmer) and his own past short stories. And he has his first and only bestseller on his hands.

Whee! But that's not enough for Dvorkin. He brings in the competition in the form of televangelists, other New Age channelers, politicians, and more, sending up everything in sight. Dvorkin has a savage wit, and he employs it relentlessly.

But not successfully. He's awfully heavy-handed, and his hero is an extraordinarily unpleasant twit. The basic conceit moves from cute to nauseating long before the book is done.

David A. Hardy is a well-known SF&F artist who has been voted "Best European SF Graphic Artist" and whose luminous work stands up nicely to prolonged examination (see my May 2002 review of *Hardyware: The Art of David A. Hardy*). But he would also like to be known as a writer. So here is **Aurora: A Child of Two Worlds**, part of which appeared in 1986 in *Orbit*.

The tale begins in Blitz-era London, when a strange craft slips in among a line of Heinkels bearing bombs. One of those bombs brings a house down upon a young mother of a crippled son and a baby girl named Aurora. Mother and son are pinned. The baby's cries cut off. But then a strange figure appears to shift the rubble and help the son to his feet. He can walk now! And the baby? She breathes, she's fine, but though mother doubts her own sanity, she's not the same kid.

Fast-forward to the pop-music scene, when a street-kid named Aurora falls in with a wannabe pop group, takes a turn on the keyboard, makes a tremendous hit, and promptly drops out of sight. Same kid, looking like a teen even though she's really thirty-two. Something funny's going on.

But Aurora's getting wise. She gets a fistful of degrees, cobbles a believable background, ducks out whenever she starts striking folks as too young, redates the paperwork, and carries on. Now it's the twenty-first century, and she's on the Mars crew. An accident costs her an arm—and it grows back. More funny stuff, and now folks are beginning to wonder. Worse yet, teammate Bryan Beaumont recognizes her from the cover of that old hit album.

But Mars has ghostly lights, and when Bryan tries out his dowsing talent, they find a derelict flying saucer a bit less than a century old. Parts of it still work, its cargo bay is full of pods containing dead babies, and a display tells of a world stricken by disaster.

You get the idea, or at least the major points. Hardy has an effective style with the kind of attention to visual detail one might expect of an artist. The tale has an undeniable charm in a somewhat retro mode. Yet his characters are a bit thin.

Even Aurora seems an innocent who falls into events willy-nilly, even into her abrupt marriage to Beaumont. The story happens to her; even though she has a crucial world-saving mission, she has no clue till the very end, by which time all the public hullabaloo surrounding the discoveries on Mars has made it moot.

Chesley Bonestell (1888-1986) started his professional life as an architect. He designed the facade of the Chrysler Building, among other things! Later he became a magazine illustrator and a matte artist for such films as *Citizen Kane*. In the 1940s, he combined all this with a love for astronomy and earned renown for astonishingly realistic space paintings, including those that in *Collier's* made the von Braun vision of space stations and moon bases seem realistic and thereby helped get the US space program started. And then there were the covers for SF magazines, including this one.

The awards given by the Association of Science Fiction and Fantasy Artists to honor the best illustrations for book and magazine covers and interiors, games and other products, 3D work, unpublished work, and overall artistic achievement have been called Chesleys ever since his death. And now we have **The Chesley Awards for Science Fiction & Fantasy Art: A Retrospective**, assembled by John Grant and Elizabeth Humphrey, with Pamela D. Scoville. Few of the works reproduced here look like anything Bonestell might have done himself, but overall the book is an eloquent lesson on how rich is the imagery of SF&F at its best and a luscious trove of reminders of books read and loved in years past.

The artists represented here (with biographical bits at the end) include Bonestell, Janet Aulisio, Thomas Canty, David Cherry, Alan Clark, Vincent Di Fate, Bob Eggleton, Frank Frazetta, Frank Kelly Freas, Brian Froud, James Gurney, Jody Lee, Carl Lundgren, Don Maitz, Barclay Shaw, Michael Whelan, and many others.

Treat yourself.

Not all artists win the Chesley award, even though they may do excellent work, have fans, and be deemed worthy of appreciative volumes such as **The Art of John Berkey**. Berkey's roots are in the American West of South Dakota and Montana, and his work shows the signs in fishing and hunting scenes, Indian massacres, and Currier-Ivesish Americana. He can do peaceful scenes, but more often he gives full rein to his talent for emotional verve and dash, often rendered in a "dazzlingly evocative neo-Impressionist style." In SF, his signature (insofar as he has one) is organic spaceships that look like tumorous sharks, even to dorsal fins or conning towers that would look more at home on a submarine. I was not amused by his comment that "There are hazards in knowing too much about engineering or technology. It can limit the imagination." I think "looking real" should trump "looking cool," but what the hey. I'm not an artist. ■

> 'Tis one of the great gifts of mind to be able to offer what is needed at the moment.
>
> —Baltasar Gracián

Dear Ms. Shaffer:

I am referring to your comments (*Analog*, December issue, page 56) regarding British society. Thank you for not making the mistake that so many others have made and referred to these people as "English." Like with a certain Jesus Christ, there seems to be no definitive way to actually "prove" that Arthur existed, however, like with the former, the strength of the traditional legend seemingly lends it validity.

Whether minor king or warlord, someone named Arthur, according to legend, managed to keep the Angles and Saxons at bay until AD 536 plus or minus twenty years. Then surviving Roman/British society was simply overwhelmed by the combined military efforts of the Angles, Saxons and Jutes. It has been reported that in one generation, the language of the Britons was outlawed and replaced; British society and traditions were mostly assimilated. The dominant conquerors at the time were the Angles and the former Roman province of Britanicus Primus thus became "Ange-land."

Most of the Britons or Bretons who managed to escape and survive did so in Wales, Scotland and in Brittany, where strong Celtic traditions remain to this day. Interestingly, farmers in the Cornwall region of the UK today still refer to the English as 'German.' Counties such as Cornwall, Devon, Somerset, Dorset, Clamorgan, Cumberland, Durham and Anglessy reflect British place names, not German. Thank you for a very thought provoking article.

Norman Yeager

The author replies . . .

You are very correct that descendants of Britons still inhabit the British Isles. I am amused that the ancient resentment lingers in Cornwall.

For readers who are not Arthur buffs, the Anglo-Saxon invasion is truly one of "history's mysteries." It is either the world's most extreme example of an invasion and complete subjugation of a conquered people or we don't have the whole story. Archeologically, the inhabitants of most parts of England were indistinguishable from Anglo-Saxons one generation after the invasion. This means they not only learned to speak a different language, but also gave up all their old ways of living, from the layout of houses and towns to the decoration of pots. The Britons would have had to stop teaching their children to read and embrace Anglo-Saxon culture with an enthusiasm that seems contrary to human nature. It's as if modern Americans were to give up their houses in the suburbs for log cabins, learn a new language, trade pizza and fried chicken for goat stew, give up going to school, and convert to a completely unfamiliar religion. The more usual situation is for the conquered people to assimilate, even as they are assimilated. After all, the Britons should have greatly outnumbered Anglo-Saxons. There is no evidence that the conquerors practiced comprehensive "ethnic cleansing." The bubonic plague theory does seem to explain this rapid and complete exchange of cultures in early Britain.

Catherine Shaffer

Dear Stan,

Although I largely agree with your editorial in the December 2003 issue, I must take issue with the statement; "Patients who get cochlear implants later in life never learn to interpret the signals from them properly."

I suspect you are referring to those who have been deaf all their lives and would find it difficult to adjust to the new input. But because it does not read that way, allow me to clarify using my own experience.

I am a grateful recipient of a C.I. cochlear implant. I became totally deaf last year because of autoimmune inner ear disease. On March 7th this year I was operated on to insert the implant, and on April 5th I received the external speech processor and was "turned on." At first it was a cacophony of unrecognizable noise, but almost within minutes I could understand some words spoken by the audiologist. Now, five months later, I am okay with one-to-one conversation, can talk on the phone and listen to news broadcasts. I still need some close captioning for TV drama. I miss music, although my audiologist tells me even that will come back over time.

A lifetime of normal hearing has "wired" me for sound. So I already have the mental pathways to interpret the signals from the processor. Yet considering only 24 electrodes are substituting for thousands of cochlear hair cells, C.I. is an astonishing demonstration of the adaptability of the human brain.

A final comment: I don't know if any of your other writers are deaf, but during those few horrible months of absolute silence, my writing became more than a hobby: it became a necessity.

J. Brian Clarke

Quite right: I should have specified that I was referring to patients who had always been deaf. Those who learn to hear and then lose the ability, at least in many cases, still have the neural wiring and programming to interpret input when it is restored to them.

Dear Stan,

In general, I thoroughly enjoy your editorials. While I do not always agree, they are usually well written and always thought provoking. Your recent editorial, "Child, Village, and Bug" is, unfortunately, one that is surprisingly poorly written. The problem is its reliance on generalities for its basic premises.

The first, and less important, is "vaccinations," with the lumping of all possible vaccinations into one, presumably safe, object. Specific vaccinations have a significantly higher risk than the average risk for all "vaccinations." In addition, no matter the relative safety of any one vaccination, the "cocktail" of multiple vaccinations is untested and of unknown risk. Interactions can have surprising and, as we saw with Fen-Phen, deadly consequences.

But the major generality causing me problems in your editorial is the "village." What is this "village"? You speak of this village as if it were a single entity with rights and purpose, and that simply does not exist.

Point out that village. If you say it is "the community" then you still have the same generality. It does not have a single voice and purpose. Who do *you* select as the voice for this village? Do we have an election on every parental question? Is it the school board, the mayor, some selected group of doctors and scientists? Who? And when you have made your selection, answer why that specific entity has the authority to overrule parents on such questions? What is their experience and track record in choosing what is right for all children? You attempt to make the point that parents might not be competent by citing some exceptional situations, but that proves the opposite. These cases stand out because they *are* exceptional. Most parents make choices for their children that are *not* controversial or even questionable. But controversial or not, who better to determine what is best for their children than the parents? Who knows their children better? Who loves their children more? I'd rather parents than some scientist in Washington deciding, for instance, that 5 percent is an "acceptable risk" for some vaccination or procedure on children.

It is my experience that parents who go to the trouble to buck the trend are most often better informed on the subject, simply because it takes guts to go against the flow and they need all the reasons and support they can get. It is not my experience that they do this on a whim or baseless fears—as you seem to imply.

If some rare parent does something truly dangerous to their child, that specific case can be dealt with without stomping on the rights and duties of all parents. We already have tons of laws protecting children. We don't need to create some fictitious "village" to give us a reason to impose authoritarian solutions on all children.

Kimball Roger

I find it ironic that you attack the editorial for "reliance on generalities," considering the abundance of them in your response—as well as reading things into my words that I never put there. Perhaps a close, careful rereading of both might be in order?

Dear Stan,

I was grattered, flatified, and pickled tink that you chose "By Any Other Name" to make your point with in "Child, Village, and Bug" (which sounds like a law firm in a David Kelly series). Thank you, sir.

The whole cochlear implants controversy makes me want to bang my head against a wall. At a certain point, denial becomes psychosis. It's well established that kids can learn two or more languages fluently, so why would the ability to hear prevent them from learning to sign, from participating in deaf culture?

I myself have been handicapped all my life, by lungs that collapse if I change a tire. What's the big deal? I see nothing intolerable about being, or admitting that I am, handicapped. I feel zero need to insist I am not handicapped. I don't require a special euphemism, "differently-lunged," or "thoracically challenged." And in a million years it would never occur to me to surgically maim my son so that *his* lungs would be likely to collapse, in order to be sure he doesn't miss out on the rich cult . . . excuse me, rich culture I've made from my specialness.

I'm all for freedom, but some people should just be slapped and told to get over themselves.

Anyway, thanks again for the mention.

Spider Robinson

Dear Sir,

Having just received the December issue, I read with a great deal of pleasure the notice that the January/February edition will be a double issue. Despite the fact that it will, as per usual arrive in this country far too late to allow me to vote in the AnLab, I welcome it as it will allow novella-length stories to be published in one issue—something which will alleviate the pain and tension of waiting for the climax of such brilliant stories as "Moonstruck".

However.

If it also means that more rubbish like "Lucky Luke" by P. J. Plauger will also be affronting readers' eyes, then it will not be as welcome. While the idea of manipulation of probability is a worthwhile and interesting plot device and one with more scientific rationale from the quantum physics field than some of the other impossibilities that sometimes grace *Analog*'s pages (Such as FTL, intelligent aliens, and love), the storyline is not merely maudlin in its sentimentality, but positively tantamount to condoning murder in that it features promiscuity and unprotected sex.

In this day and AIDS, the push should be towards rigidly enforced celibacy for the global population, not more of this behavior. (As a lexicon pedant, you should realize that this word, "celibacy," has been debased to allow improper behavior, not condoned by marriage.) Indeed, it would be a limited thinker who would not come to the conclusion that celibacy, if continued as a world policy for forty years or so, would effectively cure every single human problem currently facing us. No one could argue with that. If your intent in publishing this story was to shock and provoke, that goal was certainly achieved. The story to my mind has few other merits and I cannot believe the author wrote it for anything other than as a test of the theme.

D F Stuckey

Sorry you didn't like "Lucky Luke"; I trust you'll respect the right of many others to disagree strongly. Meanwhile, I suspect the author will be suitably astounded by some of what you read into his story, and your proposed "solution." ■

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UPCOMING EVENTS Anthony Lewis

2–4 July 2004
INCONJUNCTION (Indiana SF conference) at Indianapolis Sheraton Hotel & Suites, Indianapolis IN. Guest of Honor: Eric Flint. Media Guest of Honor: David Winning. Filking Guests of Honor: Barry Childs-Helton, Sally Childs-Helton. TM: James O. Farlow. Registration: $30 until 1 May 2004, $35 thereafter. Info: InConJunction XXIV, Box 68514, Indianapolis IN 46268-0514; conchair@inconjunction.org; www.inconjunction.org.

2–5 July 2004
WESTERCON 57: CONKOPELLI (West Coast Science Fantasy conference) at The Wigwam Resort, Litchfield Park AZ. Guest of Honor: C.J. Cherryh. Artist Guest of Honor: David Cherry. Music Guest of Honor: Heather Alexander. Fan Guest of Honor: John Hertz. Local Author Guest of Honor: Diana Gabaldon. Registration: $75 until 31 May 2004. Info: Westercon 57: ConKopelli, Box 67457, Phoenix AZ 85082; info@conkopelli.org; www.conkopelli.org.

16–18 July 2004
CONFLUENCE 2004 (Pittsburgh area SF conference) at Four Points Sheraton, Pittsburgh PA. Registration: $30 until 1 July 2004, $40 thereafter. Info: Confluence, Box 3681, Pittsburgh PA 15230-3681; (412) 344-0456; confluence@spellcaster.org;

23–25 July 2004
TRINOC-CON (Carolinas SF conference) at Durham Marriott & Civic Center, Durham NC. Guests of Honor: Steve Miller, Sharon Lee. Gaming Guest of Honor: Sam Lewis. Registration: $35. Info: Trinoc*coN Corporation, Box 10633, Raleigh NC 27605-0633; info@trinoc-con.org; www.trinoc-con.org.

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30 July–2 August 2004
MYTHCON XXXV (Bridges to Other Worlds) at University of Michigan (Michigan League Building), Ann Arbor MI. Guests of Honor: Neil Gaiman, Charles A. Huttar. Registration: $50 (Mythopoeic Society members), $60 (non-members). Info: Mythcon 35, Marion VanLoo, Co-Chair, Box 71, Napoleon MI 49261; mvanloo@comcast.net; jkollman@umflint.edu; www.mythsoc.org/ mythcon35.html.

6–8 August 2004
CON-VERSION XXI (Alberta SF conference) at Calgary, AB, Canada. Guest of Honor: George R.R. Martin. Canadian Guests of Honor: Spider & Jeanne Robinson. Registration: C$40 until 1 August 2004, C$50 at door. Info: Calgary SF & Fantasy Society, Box 20098, Calgary Place RPO, Calgary, AB T2P 4J2, Canada. www.con-version.org.

13–15 August 2004
ARMADILLOCON 26 (Texas area SF conference) at Hilton North, Austin TX. Guest of Honor: Sharon Shinn. Fan Guest of Honor: Chaz Boston Baden. TM: K.D. Wentworth. Editor Guest of Honor: Stanley Schmidt. Artist Guest of Honor: Charles Vess. Registration: $35 until 25 July 2004, $40 thereafter. Info: ArmadilloCon, Box 27277, Austin TX 78755; (512)477-6259; armadillocontx@yahoo.com; www.fact.org/dillo/. ■

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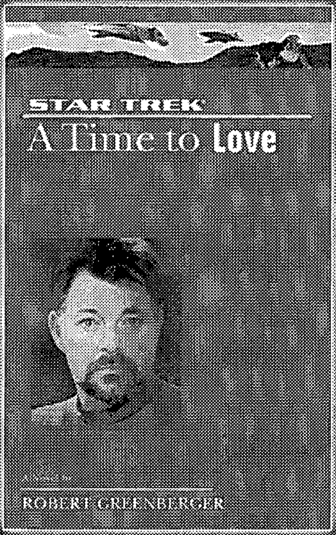
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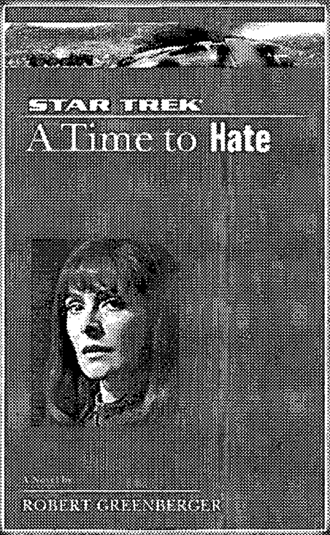
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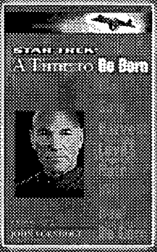
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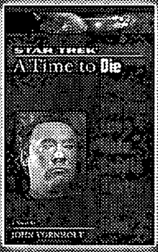
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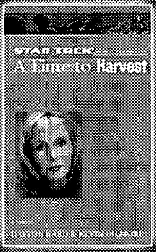
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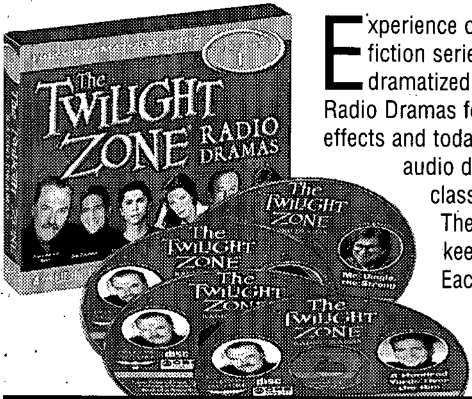

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